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# MINUTES OF MEETING.

26018—

YOKOHAMA, October 15th, 1883.

A General Meeting was held on Monday, 15th October, 1883, in the Grand Hotel, Yokohama. The Chair was taken by the President, Dr. Hepburn, supported by Mr. Hannen, the Vice-President, several members of Council and of the Society, and numerous ladies and visitors.

The minutes of the annual meeting held in Tôkiô on 20th June were read and approved. The Secretary announced, as a communication from the Council, that a request had been made to H. E. Sir Harry Parkes to allow his name to be added to the list of Honorary Members; also that, as Mr. Hattori, who had been elected a member of Council at the last meeting had declined to serve, Mr. Naibu Kanda had been elected in his stead; also that Mr. Henry Gribble had been elected a member of Council in the place of the late Dr. Geerts.

The President spoke with feeling on the loss that the Society had sustained by the early death of their esteemed member, and referred in terms of high eulogy to the services rendered by Dr. Geerts to the cause of science, and remarked that it was a source of pride to the Society that most of the valuable results of Dr. Geerts' energetic and patient study should have been given to the world through the pages of the Asiatic Transactions.

Mr. Gribble then read his paper on "The Preparation of Japan Tea," in which, after describing the origin of Tea in Japan, so far as legend and history afford us information on the subject, he referred briefly to its botany and chemistry, and then described in detail the process of country-preparation, from the planting of the seed to the packing of the cases for transporting the fired leaf to the treaty ports. Details were also given of the country cost of producing tea. The further process of refining in foreign godowns was then referred to, as also the operation of artificial colouring, and the use of machinery for tea-firing. A description was also given of the preparation of Japan Congou (furnished by Mr. James Green of Kôbe) and samples of Brick-tea were exhibited, which had been supplied by Mr. Ringer of Nagasaki. The paper further contained Tables showing the total export of Tea from Japan during the past twenty years, and the prices obtained for different grades of Tea in Yokohama during the past seventeen seasons. The Government Department of Agriculture and Commerce had also furnished an addition to the paper by a tabular statement and diagrams showing the extent

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of land under tea cultivation in Japan. The Appendix also contained supplementary pages by Dr. Divers upon "The chemical properties of Tea" and upon "Artificial colouring." The paper was supported by numerous illustrations of the different processes of tea manufacture, which had been lithographed, and are to form part of the volume when printed.

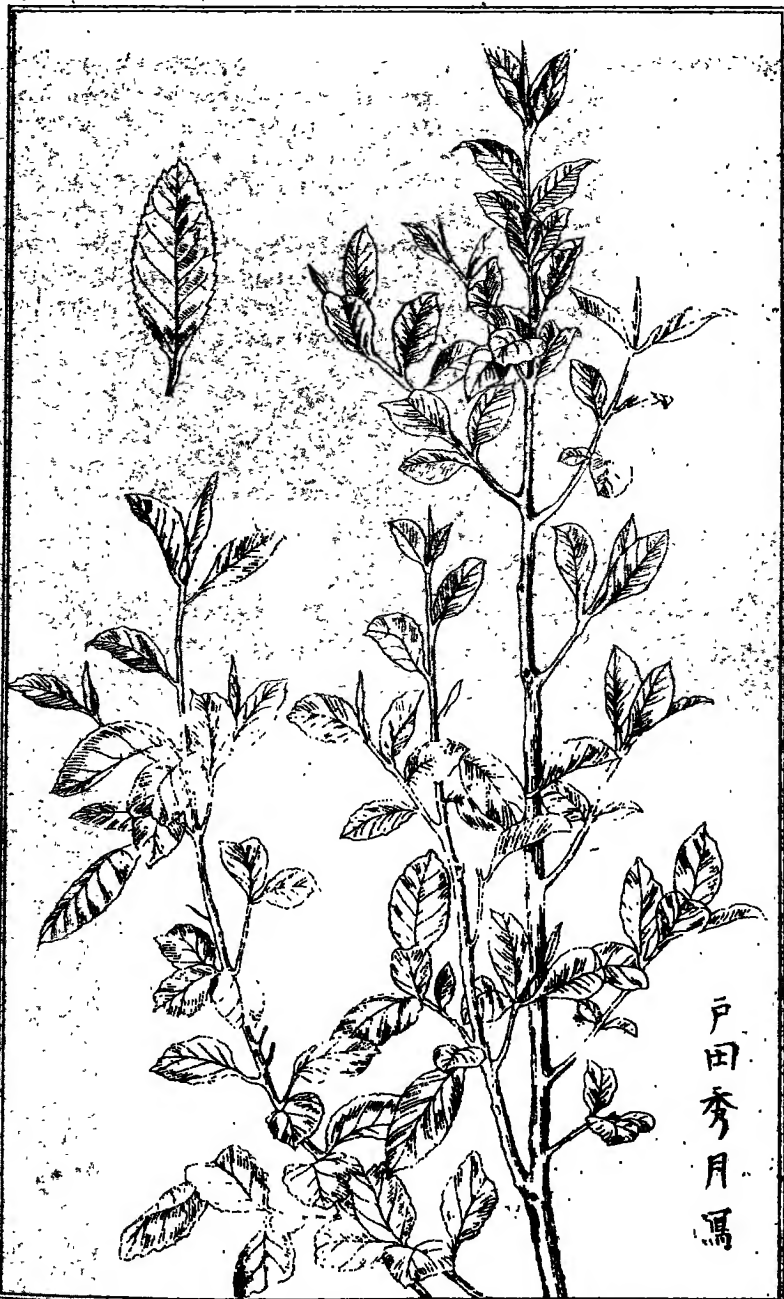
During the evening a venerable Japanese professor of the ceremonies of the *Cha no Yu*, with two fair assistants, had been preparing some cups of *Hikicha* (powdered tea), which were partaken of by the visitors after the meeting had dissolved and assumed the more social aspect of an evening tea party.

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TRANSACTIONS OF THE ASIATIC SOCIETY OF JAPAN H. MEIKLEJOHN & CO. LITH. NO. 26, WATER ST. YOKOHAMA

THE TEA PLANT. Small leaved variety ("O cha"). Leaf natural size.



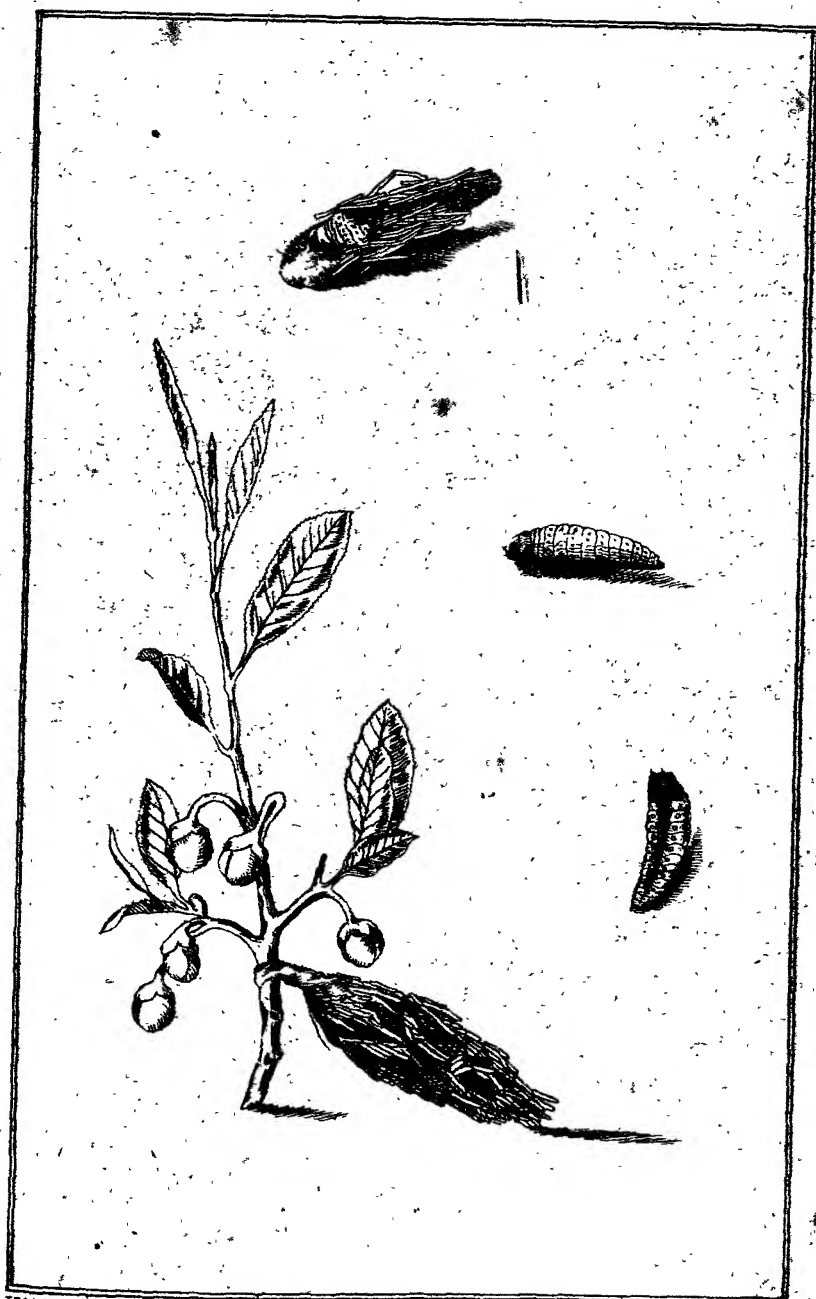


TRANSACTIONS OF THE ASIATIC SOCIETY OF JAPAN. R. MEIKLEJOHN & CO., LITH. NO 26, WATER ST YOKOHAMA

# THE TEA PLANT.

Large leaved variety ("Mé cha"). Leaf, flowers and seeds natural-size.



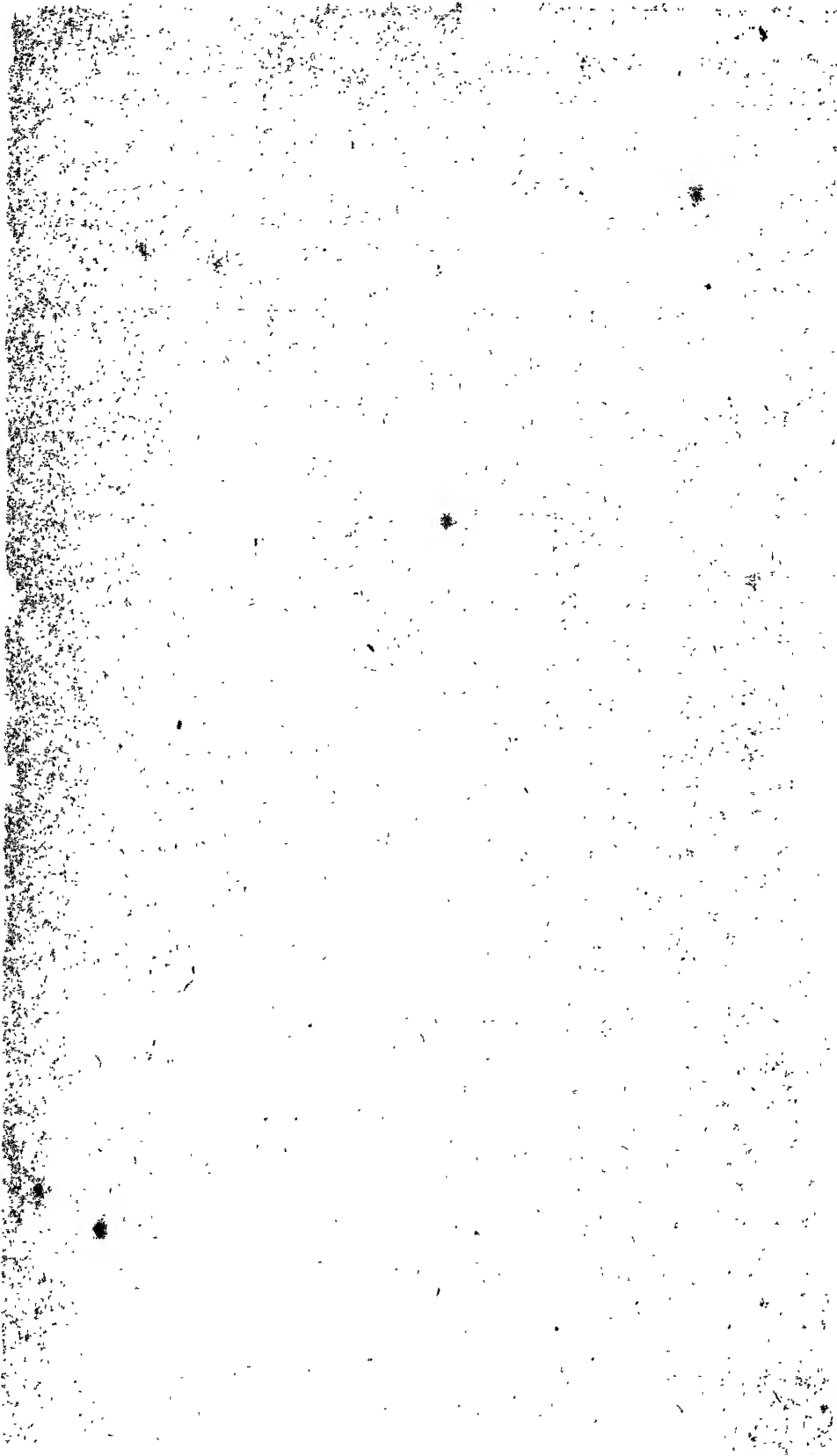


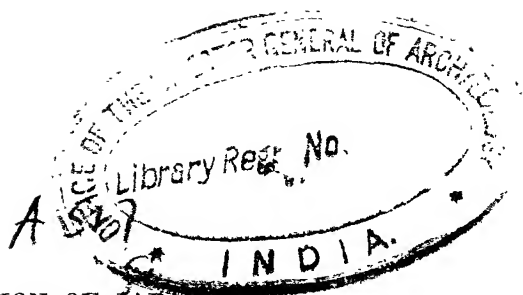
TRANSACTIONS OF THE ASIATIC SOCIETY OF JAPAN: R. MEIKLEJOHN & CO LITH NO 26 WATER ST YOKOHAMA

THE LARVA AND LARVA CASE OF THE "MINO MUSHI"

(Psyche. sp?)







## THE PREPARATION OF JAPAN TEA.

BY HENRY GRIBBLE.

[*Read 10th October, 1883.*]

A description of the preparation of Japan Tea cannot be complete without a reference to the origin of the plant, which we all know by name, many of us by sight, and all of us by means of the refreshing beverage it supplies to our wants—a stimulant to some, a sedative to others, and to all a household drink, whether taken in basins as by Dr. Johnson or in the small familiar tea cups of Japanese make. A beverage, too, with strong medicinal qualities and of active counter-irritant power to food which, by itself, might be injurious to life. For does not Kaempfer quote, upon the authority of Chinese physicians, the case of a woman who, being weary of a passionate and scolding husband, took advice as to the best way of getting rid of him, and was instructed to allow for his daily food only “swine’s flesh” and all manner of fat things, which should undoubtedly kill him in a year’s time? But this good woman, not content with waiting the prescribed time, took other advice, and was bid give her husband, then almost reduced to a skeleton, constant drinks of a strong infusion of tea leaves, which should without fail do her business quickly. This attentive wife, for dispatch sake, made use of both prescriptions; but alas! to her great grief she found that by the joint use of these two contraries her husband, instead of declining, soon got better, recovered his strength and was at last restored to perfect health.<sup>1</sup>

The Chinese physicians who told this story to Kaempfer were not less impressed with the powerful effects of tea than were our own first medical writers who discussed the subject, and whose fears of its abuse

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<sup>1</sup>See Appendix to Kaempfer’s History of Japan.

blinded them to its merits. In 1722 an essay appeared, stating that "among many other novelties there is one which seems to be particularly the cause of the hypochondriac disorders, and is generally known by the name of thea, or tea. It is a drug which of late years has very much insinuated itself so well into our diet as regales or entertainments, though its occupation is not less destructive to the animal economy than opium, or some other drugs which we have at present learned to avoid." And in a tract published by a Dr. Lettsom, the first cause of the "pernicious custom of drinking spirits to excess" was stated as "often owing to the weakness and debility of the system, brought on by the daily habit of drinking tea; the trembling hand seeks a temporary relief in some cordial in order to refresh and excite again the enfeebled system, whereby such persons almost necessarily fall into a habit of intemperance." Even Dr. Johnson wrote as apologetically of his love for tea as ever an opium smoker could pen his penitent confessions. The learned Doctor drew his own portrait as "a hardened and shameless tea-drinker, who for twenty years diluted his meals with only the infusion of this fascinating plant; whose kettle had scarcely time to cool; who with tea amused the evening, with tea solaced the midnight, and with tea welcomed the morning."<sup>2</sup> For ourselves, it is amusing to record the imagined danger felt by our forefathers for the beverage which cheers us all, for the innocent drink which gives occasion for an afternoon gossip, for the refreshing cup which renews the energies of a midnight student, and—luckily for so many of us in Japan—for the leaf which gives us our occupation (I purposely avoid saying profit) by supplying some 35 millions of pounds weight to the thirsty inhabitants of the United States.

All writers agree that the Tea plant was introduced into Japan from China, and most of them fix the ninth century as the date of its importation. The first mention of it is in the reign of the Emperor Kwanmu, when a priest named Saitō, better known as Denkiō Daishi, brought tea seeds from China and had them planted at Uji (A.D. 805). In the reign of the Emperor Saga, A. D. 810, it is said that "tea ceremonies began," and that in 815 tea plants were planted by Imperial order in

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<sup>2</sup>Encyclopædia Britannica.

the provinces of the Home circuit.<sup>3</sup> It was not, however, until the twelfth century that the tea shrub became properly appreciated in Japan, through the medium of a priest of the Zen sect of Buddhism, one Yei-sei Zenji, who visited China in 1180 and was then impressed with the love of his brethren of the Zenshiu creed for the decoction made from the tea plant. So charmed was he with this beverage, and so desirous of gaining the credit of introducing it to his countrymen, that on his return to Japan he carried with him a book of instructions for curing the leaf, as well as a supply of the choice seed, which was planted out at Hiburi, in the province of Chikuzen. It was from this place that another Buddhist priest named Miō-e (who died in A. D. 1232) took the seeds, which he planted at Uji, thus commencing the tea plantations which to this day have remained so famous.<sup>4</sup>

The Buddhist Zen sect has evidently to be credited with the first practical introduction of tea into Japan, and it is to the founder of that sect, Daruma, that tradition credits the miraculous growth of the shrub in this country. The story is thus told by Kaempfer, and will bear repeating :

Daruma was the third son of an Indian King. He was a holy and religious person, as it were a Pope in the Indies, and the eight and twentieth successor to the holy See of Siaka (Buddha), the Founder of the Eastern Paganism, who was an Indian himself, and a Negro, born one thousand twenty-eight years before our Saviour's nativity. About the year of Christ 519 this Daruma came into China. His design was to bring the inhabitants of that populous Empire to the knowledge of God, and to preach his Gospel and Religion to them, as the true and only one that would lead them to salvation. Nor was it only with his doctrine that he endeavoured to make himself useful to men, and acceptable to God. He went still further, and strove for Divine Grace by leading an austere and exemplary life, exposing himself to all the injuries of the weather, chastizing and mortifying his body, and subduing the passions of his mind. He lived only upon vegetables, and thought this to be the highest degree of holiness, to pass days and nights in an uninterrupted *Satori*, that is a contemplation of the Divine Being. To deny all manner of rest and relaxation to the body and to consecrate the mind entirely,

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<sup>3</sup>Rui-jin Koku-shiu (類聚國史).

<sup>4</sup>Captain Brinkley's "History of Japanese Ceramics" in the *Chrysanthemum*, where also the introduction of tea into Japan is vividly described as one of the chief incentives to native art in producing elegant tea receptacles and in furnishing æsthetic designs for the accessories to the *Cha no Yu*.

volatile oil, to which it owes its peculiar aroma ; (3) theine, the crystalline principle, which is characteristic alike of tea and coffee, and which is to those beverages what quinine is to bark. The other component parts are those which, in different proportions, enter into the composition of all plants. The tannic acid varies in different sorts, and according to different analyses, from 13 to 26 per cent. The volatile oil in good teas is about  $\frac{3}{4}$  per cent. The theine is represented to vary very considerably, ranging from  $\frac{1}{2}$  to 6 per cent.<sup>7</sup> According to the "Tea Cyclopædia" (published by the *Indian Tea Gazette*), one pound of the best Tea contains the following ingredients :

	oz.	grains.
Water .....	0.	350
Theine .....	0.	210
Casenie .....	2.	175
Aromatic oil .....	0.	52
Gum .....	2.	385
Sugar .....	0.	211
Fat .....	0.	280
Tannic Acid .....	4.	87
Woody fibre .....	3.	87
Mineral matter .....	0.	350
	<hr/>	
	16 oz.	

I am, fortunately, enabled to add in the Appendix to this paper a more exhaustive description of the chemical properties of Japan Tea, which has been kindly placed at my disposal by Dr. Divers, and where it will be noticed that he makes some corrections to this analysis.

The principal tea-producing provinces in Japan, are :—Suruga, Mino, Totomi, Isei, Musashi, Shimosa and Yamashiro, the leaf grown in the latter being the favorite.<sup>8</sup>

*Planting.*—The tea plant requires a well-drained soil ; it grows well on level ground with well-kept drains, but is more often seen on gentle hill-slopes and again on steep inclines, where terraces are cut to

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<sup>7</sup> Encyclopædia Britannica.

<sup>8</sup> See Table annexed to this paper for detailed list of all tea-producing provinces in Japan.

maintain small level patches and to prevent too violent rushes of water during heavy rains. These terraces on the hill-sides, when covered with plants, look very picturesque; but they are only selected as being the cheapest ground procurable, and not because the tea requires any such elevation. A new plantation is started from seed, planted in circles of about two feet diameter; each circle receives about 30 seeds and its centre is placed at a distance of about five feet from its neighbour.

*Growing.*—The circle of seed develops into a compact bush, some shoots of which will be found to bear leaves of a darker colour and of harder texture than the others and also much smaller. This difference in the leaf on the same tea bush is one of the difficulties of the tea-farmer and tea-picker, and it seems difficult to believe that with more care this trouble cannot be avoided. In the third year of its growth the tea plant bears leaves ready for picking, and it is considered at its best from the fifth to the tenth year. But age does not deteriorate the plant, the only difference being that with years it requires more manure. The shrub is not allowed to grow beyond a height of three to four feet, necessary both for the convenience of picking and for the strength of the new shoots.

*Blights.*—The tea plant in Japan would appear to be particularly free from Blights, of which so many attack the shrub in India. Its principal enemy here is the *mino mushi* (Psyche), which attaches its cover to the tree and will do considerable damage if not removed in time. I have here a specimen of one of these tea-parasites and I also give a drawing of it, from which you will see that it cannot easily avoid detection. The red spider, tea bug, green fly and orange beetle, so destructive in India, do not seem to trouble the Japanese tea planter.

*Picking.*—As the season is early or late, the first picking commences at the latter end of April or beginning of May, and lasts about twenty days or a month. The second crop is gathered in June and July, and sometimes a third one later on. This work is performed almost entirely by girls, who deftly pick off the new leaves, but very often also the whole of a new shoot, so that long stems are frequently met with in their baskets, where leaves only should be seen. The shrub, being an evergreen, has still many of its last year's leaves, so that some skill is necessary to fill a basket quickly without also including some

of the old growth. A girl will pick, at the beginning of the season, about one *kwan-me* of leaves ( $3\frac{1}{2}$  lbs.) in a day, for which, this year, her wages were 15 *sen*.

#### THE COUNTRY PREPARATION.

The following notes on the country preparation were made during a few days stay at Shidzuoka (the capital of Suruga) early in May this year, at the time when the first pickings were being made and when the whole district was alive with the industry of a new tea crop. Suruga and the adjoining province of Totomi are two of the principal tea producing districts of Japan, and at the time of my visit the tea gardens on the plain, on the hill-slopes and on the terraces up the hill-sides were dotted with the figures and large sun-hats of the girls picking the leaves. The roads leading to the town were seldom free from men carrying baskets full of green leaves to be fired; others dragging to the port of loading cart loads of the finished tea for shipment to Yokohama. In the town itself dealers bargain for each small lot of tea brought in from the fields and the carriers either stay to sell their baskets-full, or pass on with a word of chaff if their load has already been bespoken, or if it has to go direct to the firing place of the owner of the plantation where the tea has been picked.

As a rule the tea belongs to very small proprietors, who fire their few catties a day, generally in the entrance of their only apartment, and then sell the fired leaf to larger dealers who, as principals or go-betweens, mix their various purchases together and then send twenty or more boxes of similar tea for sale at the treaty ports. But the process of preparing the green leaf is the same whether done in a small shanty or in the godowns of a well-to-do merchant. It is as follows:—

*Steaming.*—As soon as possible after the leaves have been picked they are steamed by being placed in a round wooden tray, with a brass wire bottom, over boiling water; the tray filling up the mouth of an iron cauldron set in plaster over a wood fire. The tray is about 18 inches diameter, and receives about a couple of handfuls of green leaf; the lid is put on to confine the steam, and the process is complete in about half a minute; the attendant taking one look at the leaves and

stirring before removing them. The water in the cauldron showed  $210^{\circ}$  Fahrenheit and the bottom of the tray  $185^{\circ}$ . The moist leaves, with their natural oil now brought to the surface, are then tumbled on to a wooden table for a few minutes, and then taken into the firing room, where the principal manipulation has now to be performed.

*Firing.*—A box-shaped wooden frame about 4 feet long by  $2\frac{1}{2}$  feet broad, coated with plaster, forms the oven. Charcoal (well covered with charcoal ash) is alight in the bottom of the oven, and about a foot and a half above the charcoal rests the wooden frame with tough Japanese paper stretched across it. This paper gets darkly tanned by the oil from the leaves, but below it shows no signs of getting burnt, and one such paper tray will often do more than a whole season's work without being renewed. The heat of the paper at the time of firing is about  $120^{\circ}$ .

About 800 *me*<sup>9</sup> ( $6\frac{1}{2}$  lbs.) of green leaves are thrown on to one of these paper trays and a man (for the work can only be done by men<sup>10</sup>) now proceeds to fire this quantity, which by the time it is finished becomes reduced to about 170 *me* ( $1\frac{1}{2}$  lbs.). At first he throws up the soft, moist leaves in quick succession and keeps the whole mass moving without any attempt at rolling or twisting. Gradually the leaves assume a darker colour, and gradually he works them up into balls, rolling the balls between his hands, separating the leaves again, rolling them on the hot surface of the paper, again collecting them into balls, which he will now roll backwards and forwards on the paper, and finally do so with considerable strength and pressure, occasionally resting one elbow on the edge of the tray and rolling the tea between the palms of both hands with all his might. After some hours work (depending upon the quality of the tea) the leaves have all become separately twisted, and have changed their colour to dark olive purple. They are now crisp, long, thin wiry "spills," and, in the case of the best leaf, look more like slender toothpicks than the leaves of a shrub. When finished, the tea is strewn on a similar firing tray, but at a lower temperature (about  $110^{\circ}$ ), and is there allowed to dry until it becomes quite brittle. The heat is then further reduced to about  $95^{\circ}$  and

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<sup>9</sup>120 *me* = one pound.

<sup>10</sup>Their wages this year were 50 *sen* per day, during which they would finish about 700 *me* of fired tea (about 6 lbs.).



the tea left for 4 to 6 hours, even longer if it is intended to keep it in stock for many months. Tea well fired in this manner and afterwards packed in earthenware jars will keep for a whole year without spoiling.

*Sorting.*—After leaving the firing room the tea passes to the hands of a man who sorts the leaves by jerking them up and down in a bamboo hand tray, by which he separates a large proportion of the light from the heavy leaf.

*Sifting.*—The tea is then passed to a sieve suspended from the roof and swung backwards and forwards with a circular motion, allowing all the fine thin leaves to collect in a heap on the ground and retaining the large and coarser ones to be thrown into a separate heap.

*Hand Picking.*—The completing process of the country preparation is to distribute the tea to girls, seated on the mats in front of a picking table, who sort out all the seeds, stalks and rubbish that may still be mixed with the tea. The tea, thus finished as far as the country process is concerned, is packed into wooden boxes, nailed, corded and marked, and then sent to the treaty port for sale, each box containing about half a picul.

Before following the tea into the foreigner's godown, where it has again to be fired and packed for shipment over sea, I give the result of my enquiries as to the country cost of its growth and manipulation.

Level ground, within easy distance of Shidzuoka, suitable for a tea plantation, is now said to be worth about 100 *yen* for 100 *tsubo* (3,600 square feet); ten years ago it was worth about 25 *yen*, and twenty years ago only half the latter sum. On the hills equally good ground is said to be worth an average of 30 *yen* per 100 *tsubo*.

Tea shrubs covering 100 *tsubo* will produce in their third year about 30 *kwan-me* (250 lbs.) of green leaves at the first picking and about 15 *kwan-me* at the second picking. According to this year's scale of wages (about 25 per cent. cheaper than last season's) the cost of picking 30 *kwan-me* was *yen* 4.50.

The cost of labour in firing, of charcoal, of packing boxes and of freight to Yokohama was given to me as *yen* 7, and the charges for selling in Yokohama 5 per cent. We thus have as the cost of the first crop from 100 *tsubo* of land under cultivation :—

Picking 30 <i>kwan-me</i> (250 lbs.) .....	Yen 4.50
Firing, packing and freight to Yokohama .....	" 7.00
Agency charges in Yokohama 5% .....	" .60
	<hr/>
	Yen 12.10

at exchange of 1.30 *yen* per dollar the equivalent of \$9.31 for a net weight of 6 *kwan-me* (50 lbs.) of fired tea (the loss in weight thus amounting to 80 per cent). This is equal to about \$25 per picul without any allowance for profit to the planter or for rental of his plantation. Of course if the whole of his crop were of the "Choicest" quality, this cost would leave him a large profit, but whether his tea sells as "Choicest" or as "Common" the average cost of production is not far different.

At the time of my visit to Shidzuoka the best tea, already fired and picked, was being bought by the large dealers at *yen* 2.70 per *kwan-me*, the equivalent of *yen* 43.20 per picul. The cost of boxes and expenses to Yokohama amounted to *yen* 2 per picul, making the total cost here, with selling charges, *yen* 47.46 per picul or \$36.50. Similar tea was then selling in Yokohama at a little over this price.

The value in Shidzuoka of similar tea at the same time in the previous season, was *yen* 4 per *kwan-me*, and the tea men were all loud in their complaints that, although the cost of labour was so much cheaper this year, the present would be a losing season to them, and that it would not pay to gather the second crop. This, however, has not proved the case, and, contrary to many expectations, the total yield this year of Japan tea seems likely to be little short of last season's supply. I am, therefore, inclined to think that the figures of cost as given to me at Shidzuoka were excessive, and we must probably wait for that long-hoped for period of the opening of the country to foreign enterprise before this Society can be correctly informed of the cost of producing Tea in Japan.

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Note. — 120 <i>me</i> = 1 $\frac{3}{4}$ lb.	1 <i>tsubo</i> = 36 square feet.
1 <i>kwan-me</i> = $8\frac{1}{2}$ lbs.	1,210 " = 1 acre.
16 " = 133 $\frac{1}{2}$ lb.	1 acre = 43,560 sq. feet.
1 picul = 133 $\frac{1}{2}$ lbs.	

At the date of writing these notes one dollar was equal to 1.30 *yen* (paper) and the sterling exchange was 3 s. d. per dollar, thus making the Pound Sterling equal to 7.09 paper *yen*.

The further manipulation that Japan tea has to undergo before it can be exported to America or Canada (its only markets) is familiar to most of us who reside at the treaty ports. During the season we have daily experience of the aroma issuing from the open windows of the tea-firing godowns, of the troops of tea-firing men, women and children who clatter past our windows at an unearthly hour in the morning, and who make day hideous with their noise, singing and crying. Probably most of us have also been inside these godowns and seen these women at work, stirring the tea in iron pans with unceasing vigour and song, only interrupted by the occasional shouts of the overlookers or by the motherly attentions required by the children slung on their backs or tugging at their skirts. There are two systems of finally firing Japan tea : Pan firing and Basket firing.

*Pan Firing.*—This is done in rows of iron pans (21 inches diameter by 13 inches deep) set in brick work and heated by charcoal. The tea, which has been bought probably in small lots of different qualities has been bulked into large enough quantities of the same description and is then carried by the women in baskets to the firing godown. At a given signal all the baskets are emptied into the pans (about 5 lbs. weight into each), and the fires being well lit and afterwards constantly attended to, the stirring of the leaves continues until the overseer (generally a Chinaman) considers the tea sufficiently fired, when the signal is given to take out the tea and carry it back to the packing godown, or put it through a second process of stirring in cold pans. According to the quality of the tea and the ideas of the tea-taster, the pan firing of one lot of tea may last from 40 to 65 minutes in the hot and from 25 to 60 minutes in the cold pans. When finished it is taken into the packing godown, where it is sifted to remove the dust, and then packed while still warm, into the half-chests, lined with lead, which are to convey it to the grocers and tea drinkers of America.

*Colouring.*—When colouring matter has to be used it is thrown into the pans at the proper moment by the Chinese overseer and quickly gets absorbed by all the tea. The use of colouring matter has lately given rise to considerable discussion, and there can be no doubt that, as far as it goes, it is a species of adulteration—just as much adulteration as the use of colour to make some sugar plums white, others pink or others

salmon colour. Certain tastes for colour are developed in the consumers of tea as in the consumers of sugared almonds, and it becomes the necessity of the manufacturer to meet the requirements of his customers. The American dealers have called for more or less coloured tea, and their demand has been met here by those who prepare it. That demand is now undergoing some change, and tea merchants in Japan will be only too glad when it has ceased altogether. A large quantity of tea is now sent without any colouring matter whatever, and even where it is still used it cannot be condemned as being in any way injurious to health, in the infinitesimal quantities in which it is mixed with the tea. The outcry against colouring matter has been principally caused by the excessive colour and actual weight-adulterations of the lower grades of China green tea; also by the *re-manufacture* in London or New York of teas shipped from the East—a process for which merchants here are not responsible.

Dr. Divers, Principal of the Kobu-Dai-Gaku, has kindly contributed a special report upon this part of the manipulation of tea, which will be found attached to this paper and will be read with interest as representing the opinion of an able and independent expert.

*Basket Firing.*—Basket firing consists in simply refiring the tea without any of the stirring process as gone through in the pans. A bamboo basket, shaped like a dice box, but open at both ends, is placed over a large iron brazier containing lighted charcoal (well covered with ashes) and the tea is strewed, about an inch in thickness, on a close woven bamboo tray which fits the neck of the dice box. The baskets are occasionally removed from the brazier and the tea turned over by hand in order that all may be equally fired; they are carefully replaced on the brazier, without allowing any dust or leaves to fall through the tray on to the charcoal, and in the course of 40 to 60 minutes the tea is ready for packing.

*Congou.*—The foregoing description applies to the preparation of ordinary Japan tea, during which no fermentation of the leaf has been allowed to take place. But in the preparation of Black Tea (Congou), of which a considerable quantity was made some seasons ago, fermentation has to occur and the process deserves special notice. The financial result of Japan-made Congous has not hitherto been a success, but there

broken with iron rakes in a most careful manner, so that the tea shall be all alike. It is then packed into leaded half-chests ready for shipment.

“*Another Method.*—Some tea producers in Omi and Mino, acting upon instructions given them by the *Kuwan no Kiyoku* (department for the advancement of husbandry?) about five years ago made congou after what they called the ‘Indian method’ (*Indu sei*), but the demand for their production was not at all up to their expectations, and they were forced to abandon an enterprise that cost them a lot of money in plant and buildings.

“*Preparation.*—Wilt the leaf on white calico sheets in the sun, and when sufficiently soft roll on cross planed or ribbed tables for twenty minutes. The rolled leaf is then placed on shelves in a hot-house (*muro*), bearing a temperature of 160°, where it remains till it assumes a reddish colour. It is then rolled again for ten minutes to give it a twist, and fired on thin iron plates over slow charcoal fires. After the first rolling the leaf is sifted so as to separate the pekoe from the congou.

“A very attractive tea can also be made by steaming the green leaf and then rolling it for thirty minutes, after which it is fired for forty minutes in a hot Fychow pan. The tea then somewhat resembles a Hyson, and has the advantage of being a natural green leaf, but in cup it has what the Japanese call *ao kusai*, or raw taste.”

#### BRICK TEA.

Although not to be compared to the extensive trade conducted from China, Japan tea is also made into bricks for export to Asiatic Russia. This process has been done in Nagasaki and here, but principally by foreigners, although Japanese in Tōkiyō have also made a specialty of its manufacture. I am indebted to Mr. F. Ringer of Nagasaki for the specimens of brick tea now on the table, which he describes as follows:—

“No. 1 is ordinary Higo Tea made to imitate the Chinese. This was pressed by ourselves, but is not a good example, as all our best have been given away. This kind of Tea is always made in 2-lb. bricks and packed 64 bricks per basket.

"No. 2 is a sample of Black China brick.

"No. 3 is a brick that was salvaged from the *Barbara Taylor*, wrecked on Quelpart some five years ago, and is sent to show how long and well compressed Tea will keep. This was made at Hankow.

"No. 4 was manufactured here, and was made to imitate what the Russians call Green Tea. These weigh  $3\frac{1}{4}$  lbs. each and pack 36 bricks per basket. The cake is cut in half, so that the quantity of stalks may be seen. This feature may also create wonder, but the reason I cannot explain. All I can tell you is that in certain parts of Mongolia they will not take it *without* the stalks.

"No. 5 is the same Tea wrapped and labelled."

"No. 6 is the same as No. 1, showing wrapper and label."

Mr. Ringer thus describes the process of manufacturing Brick tea:—"The first process is steaming until the tea is quite spongy; it is then put as rapidly as possible into strong, heavy wooden frames and carried to the press, where it is pressed as hard as it is practicable to do so; the top and bottom of the frame being held together by pieces of wood into which wedges are driven. There it is allowed to remain for some time, and when somewhat cooled the wedges are knocked out and the top and bottom fall away. The remaining part of the frame is then placed in a machine and a sort of lever mallet knocks out the brick. Nothing whatever is mixed with the tea, its own gluten being quite sufficient to give it consistency. An idea prevailed that bullock's blood and other abominations were used, but I have never found this to be the case, nor could I see anything of the kind practiced in the manufacturing districts of China beyond Hankow: nothing but the pure tea leaf is put into the bricks."

#### CONCLUDING REMARKS.

*Tea-Firing Machinery*—It is not surprising that, where so much manipulation is necessary as in the process of preparing tea, and where so much heat is required for firing it, attempts should have been made to perform this work by machinery and to replace the expensive charcoal by other methods of heating. When witnessing our system of preparing and firing tea, visitors from India are inclined to put us

down as being "behind the age," and to refer with pride to the enterprise of their planters in adopting machines, drying-drums or drying-boxes, and machine made sifters. It must be remembered, however, that the circumstances of the two countries are widely different, and that the tea itself when it comes into the foreign merchant's hands is quite a different article to that handled by the Indian planter. The latter picks the green leaf and packs it for final export on the same ground. We only get the tea after its character has been formed by native rolling, picking and firing. This firing is insufficient to preserve the tea during its future life until reaching the home teapot and we have, therefore, at considerable expense to re-fire and repack its for export. Again, labour in the Indian tea districts is scarce; here it is plentiful, and charcoal, dear as it is here, is still dearer in India. But foreign merchants in Japan are not deficient in enterprise and they have not failed to experiment, at considerable cost, in different kinds of machinery to economise both labour and heating power. In the records of the next decade of this Society may possibly appear a description of Tea firing by machinery, but for the present it is beyond our power to do more than mention that machinery has already been at work to perform the duties of the tea firing coolie and to supersede charcoal as the heat-giver. At present we cannot expect that those who expend capital and time in perfecting machinery should display their plans in a country where patent rights are unknown and where capable imitators do not scruple to pilfer the inventions of others.

*The Growth of the Japan Tea Trade.*—Annexed will be found a Table showing the comparative export of Japan Tea for the past twenty years, a period which nearly embraces the commencement of foreign trade after the Perry and Elgin treaties. The earliest shipments were to England, whence, however, they generally found their way to the States and Canada, there competing with China Green tea. The trade quickly became a direct one to the American Continent, and 'Japans' have now become the household drink in that country: in fact they are not wanted in any other part of the world. The Japanese have met the American demand with yearly increasing production, and the result now is that the trade is suffering from *over production*, and from want of attention to the careful growth, cultivation and country

preparation of the leaf. This result is shown by the further Table, giving the market value of tea in Yokohama during the past seventeen seasons.

For the illustrations to this paper showing the different processes of manipulation, I am indebted to an artist, Mr. Toda, who accompanied me to Shidzuoka for this purpose and made his sketches there. I have also to thank Mr. Ozaki of that town for the readiness with which he answered all the questions asked and for the information and kindness he afforded me during my visit.

By the courtesy of Sir Harry Parkes, our former President, I am enabled to annex to this paper a report from the Government Department of Agriculture and Commerce upon the production of Tea in Japan, accompanied by diagrams showing the relative production of the principal provinces, and also by a Table showing the quantity of land, in each province, under tea cultivation. These returns are of interest, but I doubt not that when the revised forms, alluded to in the report, are on record, the information to be afforded by the Agricultural Department will be of even greater interest and accuracy than what they have now so kindly placed at our late President's disposal.

I have thought it would be of interest to the Society to possess samples of Japan tea as now manufactured, and I invite your inspection of the following, viz.:—

- No. 1. Sample of "Dew drops" (*Giyokurō*), a high priced luxury; value about \$350 per picul.
- No. 2. Sample of an "Extra Choicest" Tea, as occasionally bought for export, value about \$80 per picul.
- No. 3. Sample of uncoloured "Choice" Tea as regularly exported, value about \$30 per picul.
- No. 4. Sample of an uncoloured "Good Medium" Tea: value about \$18 per picul.
- No. 5. Sample of an uncoloured "Common" Tea; value about \$8 per picul.
- No. 6. Sample of a "Choice" Tea lightly coloured.
- No. 7. Sample of a "Choice" Tea more highly coloured.
- No. 8. Sample of a "Common" Tea highly coloured.
- No. 9. Sample of Japan Congou; value about \$18 per picul.



I also show samples of the Colouring matter used, when necessary, to give the proper finish to Japan tea, viz.:—

No. 10. Sample of Powdered Soapstone (imported from China).

No. 11. Sample of Blue (manufactured in England).

No. 12. Sample of a mixture of the above ready for use.

Allow me, in conclusion, to thank you for your kind attention and to offer you a cup of the Powdered Tea (*Hikicha*), such as delights the heart of the most æsthetic and extravagant member of the *Cha no Yu*. Its value is only about \$400 per picul, and you will please imagine that the three or more hours necessary ceremonies have been gone through, elsewhere, before it has become *comme il faut* to drink this tea.

## APPENDIX.

TABLE SHOWING THE EXPORT OF JAPAN TEA (IN POUNDS) FOR  
TWENTY YEARS.

[N. B.—The figures from Kôbe commence with season 1869-70; those from  
Nagasaki have only been procurable in detail since 1876.]

[Taken from the Reports of the Yokohama and Kôbe Chambers of Commerce.]

SEASON.	ENGLAND.	AMERICA AND CANADA.	CHINA.	TOTAL.	ANNUAL EXPORT FROM JAPAN IN MILLIONS OF LBS.
1862-63 Yokohama	2,845,574	1,305,188	2,072,826	6,223,588	6½
1863-64 "	1,630,131	1,978,679	1,074,234	4,683,043	4¾
1864-65 "	2,506,927	2,475,204	257,349	5,239,480	5½
1865-66 "	988,742	6,533,233	2,586	7,524,561	7½
1866-67 "	667,061	6,722,603	.....	7,389,664	7½
1867-68 "	1,253,171	7,685,361	73,436	9,011,968	9
1868-69 "	489,387	10,183,252	1,800	10,674,439	10¾
1869-70 Yokohama	100,003	12,015,996	.....	12,115,999	13½
" Kôbe .....	.....	1,448,864	.....	1,448,864	
1870-71 Yokohama	25,430	13,093,172	.....	13,123,602	15¾
" Kôbe .....	.....	2,621,456	.....	2,621,456	
1871-72 Yokohama	.....	11,914,362	.....	11,914,362	16
" Kôbe .....	.....	4,129,170	.....	4,129,170	
1872-73 Yokohama	.....	11,845,010	.....	11,845,010	16½
" Kôbe .....	.....	4,611,774	.....	4,611,774	

## CHEMICAL COMPOSITION OF JAPANESE AND OTHER TEA.

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 BY EDWARD DIVERS, M. D.
 

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The following analyses of Japanese tea, made in the laboratory of the Imperial College of Agriculture, Tōkiyō, were published in 1879 by Mr. Edward Kinch, then Professor of Chemistry there, and now in the same position in the Royal Agricultural College of England :

	I.	II.	III.
Water .....	6.74	6.10	8.92
Fibre.....	11.20	11.70	....
Ash .....	6.53	6.10	5.26
Soluble in water.....	43.26	52.55	36.50
Tannin.....	12.50	12.10	13.19
Nitrogen .....	5.79	6.33	3.18

These quantities refer to 100 parts, and are not to be added together, because the matters enumerated are not exclusive of each other, part of the ash, part of the nitrogen, and all the tannin being contained in the matter soluble in water. No. I. is *hiki-cha* or ground-tea, from Uji, for eating with its infusion in the form of a broth. No. II. is *sen-cha* or leaf tea for infusing in the ordinary way, also from Uji. No. III. is tea made by the Chinese method, at the Experimental Section of the Agricultural Bureau, Naito Shinjiku Gardens, Tōkiyō.

I have myself had examined tea sent me by Mr. Gribble, and found it to contain moisture varying from 2 to 3½ per cent., and in the dry state, 5.73-5.8 per cent., ash or mineral matter.

Eder, in *Dingler's polytechnisches Journal*, vol. 231, has reported upon 'yellow' or Japanese tea, so called because although it is nearly black in its dry state, it differs from true black teas in becoming yellow-coloured in hot water. He has found :—

Ash .....	5½
Tannin .....	13
Insoluble part .....	60
Water .....	10

The same analyst gives a summary of his examination of various teas, Chinese, Japanese, and Indian, of which the following is an abstract:

Water .....	10	
Soluble matters .....	30	
Tanin.....		10
Theine .....		2
Tea-oil .....		0.6
Legumin (albumenoids) .....		12
Mineral .....		1.7
Other substances .....		3.7
Insoluble matters .....	60	
Albumenoids .....		12
Wax .....		0.2
Resin.....		3
Cellulose .....		20
Mineral .....		4
Other substances.....		20.8

#### REMARKS ON THE COMPOSITION OF TEA.

Tables of chemical composition, such as those of tea, are generally for the most part unintelligible and therefore without interest to others than the initiated; and even to the latter, I may add, they are often indefinite and unsatisfactory from the contradictions, real or apparent, which occur in them. A few words in addition to those of Mr. Gribble, descriptive of the composition of tea and of the applications of our present knowledge of it, may perhaps be here acceptable.

The desired effects of tea-drinking are almost certainly due to the hot-drink in the first place, and then to the tannin, the theine or caffeine, and the fragrant oil and resin in the tea. When, further, the entire tea is consumed, as in the use of *hiki-cha* in this country, tea also serves as common food.

This use of tea as *food* may almost shock those keenly sensitive to the exquisite delicate flavour and the intellectualising effects of a cup of choice tea, and it will therefore be noticed first, so as to get done with it. Attention then is called to the fact shown by the analysis by Eder and other chemists, that tea, with even as much as 10 per cent. of water,

The *ash* or *mineral part* of tea remains to be noticed. Hitherto the use of fertilisers has been but little practised with tea. Experiments in India do not appear to have had very promising results, although the effects of the use of these agents have been quite evident upon the crops of leaves got. Now any experiments in this direction can only be properly carried out under the guidance of a knowledge of the composition of the ash of tea. This ash has been repeatedly analysed, but in the present state of the matter, it would be probably of little use to reproduce the published results here. The ash of tea is slightly under 6 per cent of the tea, of which a little more than half is soluble in water when in the state of ash. In the tea itself less than a third of the mineral matter is soluble in its infusion, the rest remaining in the exhausted leaves, as will be seen on looking at Eder's general analysis. In determining the degree of adulteration of tea, the chemist depends largely upon these facts.

This ends the account of the constituents of tea. But a word should be said as to the use of the hot infusion, namely, that Europeans seem to be largely indebted to the Chinese and Japanese for a knowledge of the pleasure, if not advantage, of hot beverages, as much in hot weather as in cold.

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## ON THE ARTIFICIAL COLOURING OF TEA.

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BY EDWARD DIVERS, M. D.

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I have examined two teas and the substances used to colour them, which I have received from Mr. Gribble, and which, he informs me, are samples corresponding to some that he will exhibit to the Society at its next meeting.

A mixture of two powders, as I have learned from Mr. Gribble and from other sources of information, is employed to give some teas a charac-

teristic colour nearly like that of fine green tea. One of these powders is finely ground Chinese soapstone, and the other is Prussian-blue from England.

The soapstone is the ordinary mineral, and is cream-coloured in its ground state, and quite tasteless. I have had this soapstone analysed, and found that it can be broken up by chemical means into 61 parts of silica, 5 of water, and 34 of magnesia, with a little iron-oxide, etc. This shows that it is normal soapstone or steatite.

The Prussian-blue is of very good quality, and is a compound of carbon, nitrogen, iron, the elements of water, and a very little potassium and sodium. Although chemically related to the celebrated poison, prussic acid, it is not itself poisonous.

The mixed powder consists of about one part of Prussian-blue and nineteen of soapstone. It will be seen, on inspection, to be very blue, and is certainly very much more so than the mixtures sometimes used.

The two musters of tea are described by Mr. Gribble as being—No. 1, rather highly, and No. 2, lightly coloured. In the former I have found about  $1\frac{1}{2}$  per cent. of colouring powders, and in the latter somewhat less than  $\frac{1}{2}$  per cent. I have been told that  $1\frac{1}{4}$  per cent. is a common addition to tea.

Such now being the facts concerning the colouring of tea in Yokohama, a word or two may be said on the subject of its propriety.

The presence in tea of these powders in such quantities can hardly be objected to as being either injurious to health, or as affecting the weight of the tea to a noticeable extent. But when the question is asked, why is the colouring matter used, the answer can hardly be looked upon in other than a serious light. I will give this answer in an explanation of the matter, and will then venture to add my own judgment of it.

If the tea could be shipped after its first firing there would be little if any need to 'face' it with anything. Unfortunately, however, for both the merchant here, and the consumer in the United States, this cannot be done in the present state of things, as the tea would not keep. In order to preserve the tea for any length of time, a second firing becomes necessary. Now not only is this done at considerable expense

Generally speaking, the tea prepared for the market may be said to amount usually to one-fourth of the weight of the raw leaf. We can, therefore, assume that the original weight of the raw leaf of the prepared tea of 1881 was 140,028,964 *kin*.<sup>13</sup>

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<sup>13</sup> The quantity of *raw* leaf can hardly be taken into account in figures of this nature or for purposes of comparison. But dealing only with the prepared leaf, as shown in these returns, we find a production of 46,676,321 lbs. in 1881, from 42,024 *cho* of land under tea cultivation. This would give an average yield of about 440 lbs. per acre, considerably more than the average production from Indian plantations. I have already shown that the production of tea must here have been understated, and I think it may be safely added that the land under tea cultivation is still more under estimated.

TABLE SHOWING LAND BEARING TEA CROPS (DIVIDED ACCORDING TO THE AGES OF THE PLANTS) IN THE DIFFERENT PROVINCES OF JAPAN, FOR 1881.

(FURNISHED BY THE GOVERNMENT AGRICULTURAL AND COMMERCIAL DEPARTMENT.)

N. B.—1 cho = 3,000 tsubo = 108,000 square feet or about 2½ acres.

NAME.	AGES OF PLANTS (IN YEARS).						TOTAL.	ESTIMATE. LAND ON WH. TEA HAS SUPERSED- ED OTHER CROPS.	GRAND TOTAL.
	YRS. 1-3.	YRS. 4.	YRS. 5-6.	YRS. 7-8.	YRS. 9-10.	YRS. 11 & UPWARDS.			
	cho, etc.	cho.	cho.	cho.	cho.	cho.	cho.	cho.	cho.
Yamashiro <sup>1</sup>	30.0815	56.4002	202.8720	441.2610	395.1726	1,114.2607	2,210.0620	20.4720	2,260.5410
Yamato <sup>1</sup>	30.5003	37.7815	129.6908	189.3918	151.3127	346.8617	885.5528	151.6517	1,040.2115
Kawachi <sup>1</sup>	18.7707	17.1521	50.9826	75.7108	40.6120	98.3126	301.5621	6.1429	308.0120
Idzumi <sup>1</sup>	2.3214	2.2614	7.6907	11.6818	14.4503	30.4617	68.8813	.7616	69.6429
Settsu <sup>1</sup>	1.5110	1.3313	13.9116	18.0626	39.4505	63.8725	137.6605	11.1927	148.8602
Iga <sup>2</sup>	16.7811	28.4726	91.8018	206.5629	152.2211	180.2010	678.0615	3.6208	679.6823
Isci <sup>2</sup>	123.4101	170.0618	353.0713	593.6301	536.6510	1,134.5002	2,911.3315	389.4020	3,300.7405
Shima <sup>2</sup>	3.3814	4.3218	3.4805	2.0702	2.5609	4.9027	20.7315	6.9705	27.7020
Owari <sup>2</sup>	6.4901	4.6123	8.6808	19.6022	7.7615	28.1114	75.2726	3.6921	78.9717
Mikawa <sup>2</sup>	26.3523	8.0104	58.8724	57.5718	39.1201	160.6122	350.5602	38.7822	389.3424
Totomi <sup>2</sup>	297.5523	235.3305	507.8023	814.4221	501.4714	1,050.5801	3,407.1727	133.9810	3,541.1607
Suruga <sup>2</sup>	396.8112	321.1908	676.9008	943.9317	871.3721	2,113.1212	5,323.3118	32.1216	5,355.4704
Kai <sup>2</sup>	.6806	.9022	2.0129	1.8729	2.8722	2.5321	10.9012	1.9801	12.8816
Idzu <sup>2</sup>	61.0726	27.9521	15.2607	18.9810	10.4110	12.0319	148.7693	.....	148.7693
Sagami <sup>2</sup>	6.6025	7.8220	26.7602	34.9220	26.2404	31.2423	133.6104	.....	133.6104
Musashi <sup>2</sup>	248.1021	197.0319	508.7529	526.2118	409.0308	833.6918	2,722.8423	107.3117	2,830.1610
Awa <sup>3</sup>	.....	1.0500	.....	.....	.9000	.1500	.....	.....	2.3000
Kadzusa <sup>3</sup>	49.2705	11.0800	24.3218	48.6002	27.1121	40.9805	201.3721	4.3428	205.7219
Shimōsa <sup>3</sup>	157.6523	203.5422	327.4104	423.7520	431.2714	476.5605	2,023.2028	331.5420	2,354.7518
Hitachi <sup>3</sup>	78.8623	85.6827	172.0628	191.0108	205.7716	501.3913	1,237.8025	151.0809	1,388.8904
Ōmi <sup>3</sup>	24.9902	21.8618	122.7316	321.2714	200.5302	793.2608	1,484.6600	70.3329	1,554.9929
Mino <sup>3</sup>	72.9307	70.2818	130.3014	148.4711	131.5004	3,331.7106	3,885.2100	184.1112	4,069.3212
Hida <sup>3</sup>	9.8915	5.7500	3.4200	1.8100	1.9100	5.0500	27.8315	3.9715	31.8100
Shinano <sup>3</sup>	6.8314	9.1105	12.5609	9.3316	9.3112	13.2527	60.4123	2.9010	63.3203
Kōdzuke <sup>3</sup>	8.2010	6.6500	12.1925	9.5804	13.1912	34.4214	84.2505	9.1106	93.3611
Shimodzu <sup>3</sup>	23.9910	17.7911	43.5117	39.8501	19.8726	54.7303	199.7908	5.1910	204.9818
Iwaki <sup>3</sup>	24.7911	11.8223	22.7207	22.9306	17.3103	34.9911	134.6101	9.0514	143.6615
Iwashiro <sup>3</sup>	13.9916	11.8108	21.0011	63.0619	14.0608	19.0026	145.9128	.8608	146.8106
Rikuzen <sup>3</sup>	14.1302	9.8821	12.8216	11.2911	16.3602	42.3202	106.8124	9.1322	115.9516
Rikuchiu <sup>3</sup>	2.1320	1.1416	1.8418	1.4104	.9617	4.2421	11.7509	.....	11.7509
Rikugo <sup>3</sup>	.2329	.3504	.0703	.5307	.9610	.0227	2.1820	.....	2.1820
Uzen <sup>3</sup>	16.7629	20.1226	32.3603	19.7222	19.5618	45.8811	151.4319	1.6005	156.0324
Ugo <sup>3</sup>	23.2908	12.3602	9.4928	11.6117	14.8029	25.8127	97.4221	10.3211	107.7502
Wakasa <sup>4</sup>	1.4727	2.9405	.1625	2.6806	.3408	45.1204	53.0315	11.1200	64.1515
Echizen <sup>4</sup>	3.5425	2.2925	1.5008	2.9020	1.2223	49.9226	61.4107	5.3411	66.7518
Kaga <sup>4</sup>	8.0116	7.5020	26.8122	46.7018	50.0103	468.6627	607.7516	47.4521	655.2107
Noto <sup>4</sup>	2.5621	2.2113	3.2010	3.5000	5.9520	7.5309	21.9713	2.9000	27.8713
Etchū <sup>4</sup>	48.1523	13.0100	29.8313	68.0100	43.6000	163.8317	366.4721	117.1500	513.9221
Echigo <sup>4</sup>	62.7712	50.1229	68.8217	129.5116	72.8026	415.4101	819.8211	29.9520	849.7801
Saio <sup>4</sup>	.....	.....	.....	.....	.....	.1925	.1925	.....	.1925
Tanba <sup>4</sup>	46.7012	25.8100	57.0523	79.7805	79.6228	452.7720	741.7828	55.4600	797.2428
Tango <sup>5</sup>	3.9021	4.0222	6.9126	9.2922	13.1521	38.3101	75.9123	1.8520	77.8013
Tajima <sup>5</sup>	12.9711	13.1109	18.5102	25.9209	26.0522	72.1613	169.3706	9.8715	179.2421
Inaba <sup>5</sup>	.0100	.2900	.6011	.9303	.9305	11.8519	14.6208	4.1615	18.7823
Hoki <sup>5</sup>	.4705	.6908	1.1529	.1813	.1503	6.4807	9.1405	3.3026	12.4501
Idzumi <sup>5</sup>	2.6726	2.3405	3.3511	3.5301	2.6010	21.3718	38.8814	13.1716	52.0527
Iwami <sup>5</sup>	1.4522	2.1913	2.2809	1.1606	.5722	106.9205	114.5917	13.7311	128.3301
Ōki <sup>5</sup>	.1200	.3810	.4005	.4403	.4806	3.0722	5.2016	.....	5.2016
Harima <sup>5</sup>	9.0229	4.6201	10.0710	16.8801	13.8710	188.0129	212.5220	15.9228	238.4518
Mimasaka <sup>5</sup>	2.2801	.7224	6.7310	4.4318	4.1615	206.5613	225.0021	10.0100	235.0121
Bizen <sup>5</sup>	.0507	.1515	.5129	.0200	.1918	33.8711	31.8123	1.0308	32.8501
Bitchū <sup>5</sup>	1.9618	1.7728	2.1901	.6719	1.3601	12.8311	20.8021	7.1622	27.9713
Bingo <sup>5</sup>	1.3421	1.6517	2.9127	4.4724	1.5610	66.7426	78.7405	10.1219	88.8624
Aki <sup>5</sup>	6.5103	2.1213	10.1117	8.3821	3.5113	72.9300	101.1810	51.6112	152.7922
Saigo <sup>6</sup>	7.3010	1.1420	4.0005	3.2809	5.6710	120.6311	144.6405	30.6126	175.2531
Saigo <sup>6</sup>	7.3010	1.1420	4.0005	3.2809	5.6710	120.6311	144.6405	30.6126	175.2531
Nagato <sup>6</sup>	2.9100	3.1522	3.6112	4.8504	4.5820	48.7310	67.8808	96.2224	305.1917
Kii <sup>7</sup>	15.2517	15.2613	35.0606	32.5215	30.8602	170.0000	298.9623	8.5217	307.4840
Awaji <sup>7</sup>	.....	.....	.1715	.7000	.3000	7.3502	8.5217	.....	8.5217
Awa <sup>7</sup>	17.6810	19.8420	22.6225	18.8510	21.1500	93.9800	191.1405	234.0800	425.2205
Sanuki <sup>7</sup>	.1600	.6203	.4822	.8522	.2000	12.3510	11.6527	9708	15.6305
Iyo <sup>7</sup>	8.3108	16.1519	30.3828	11.1118	17.3418	151.6113	241.2614	322.6504	563.9118
Tosa <sup>7</sup>	39.3706	37.3705	41.2628	70.2813	69.6211	201.5516	462.4719	14.1012	476.5731
Chikuzen <sup>8</sup>	3.0924	2.7624	5.3829	4.1515	4.7807	37.7108	57.9317	14.1012	72.0319
Chikugo <sup>8</sup>	11.5102	9.7228	31.8508	20.9217	17.0126	111.7713	208.8404	139.1603	348.0007
Bizen <sup>8</sup>	18.9116	3.0828	22.2529	9.3618	21.4317	365.6205	413.6823	20.9010	434.5833
Bungo <sup>8</sup>	2.1108	3.7415	3.6724	4.4303	3.4811	51.5209	72.3010	73.8311	146.1321
Hizen <sup>8</sup>	39.6820	32.8601	58.0615	51.1701	63.5913	303.1624	557.5117	163.5213	921.1937
Higo <sup>8</sup>	21.9811	18.9803	31.8118	28.1824	28.8223	191.0101	326.8320	634.8520	961.6840
Hiuga <sup>8</sup>	80.2518	71.1006	143.1728	81.2019	104.7309	185.1704	671.9621	195.1607	867.1301
Ōsumi <sup>8</sup>	36.3606	29.6311	39.1015	11.6116	47.2619	116.7305	313.7112	19.9510	333.6622
Satsuma <sup>8</sup>	11.9106	12.7828	17.2226	11.6003	33.2916	151.5127	241.4016	28.2310	269.6326
Iki <sup>8</sup>	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tsushima <sup>8</sup>	.2800	.3500	.4800	.6900	.6800	1.1518	3.6318	3.7822	7.4140
Total	2,311.9501	2,044.6126	4,378.0921	6,101.0607	5,136.2526	17,413.8021	37,115.8215	1,004.0420	38,119.8705

<sup>1</sup>Gokina (Homo circuit). <sup>2</sup>Tokaido (Eastern sea circuit). <sup>3</sup>Tosando (Eastern mountain circuit). <sup>4</sup>Hokurikudo (North land circuit). <sup>5</sup>Saniudo (North of mountain circuit). <sup>6</sup>Sanyodo (South of mountain circuit). <sup>7</sup>Nankaido (Southern sea circuit). <sup>8</sup>Saikaido (Western sea circuit).

NOTE.—The measurements in this Table consist of cho, tan, se and bu, the last two figures being bu.  
1 cho = 10 tan; 1 tan = 10 se; 1 se = 30 bu.

The whole of the contribution from the Agricultural Department here reprinted is from a translation of the original obligingly made by Mr. R. de B. Layard of H. M. Legation, Tokyo.



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*[From the Department of Agriculture and Commerce]*

Of the 73 divisions of the Country, there are not more than 10 which possess Tea Plantations covering in all from 1,000 to 5,000 cho. Their names are as follows:

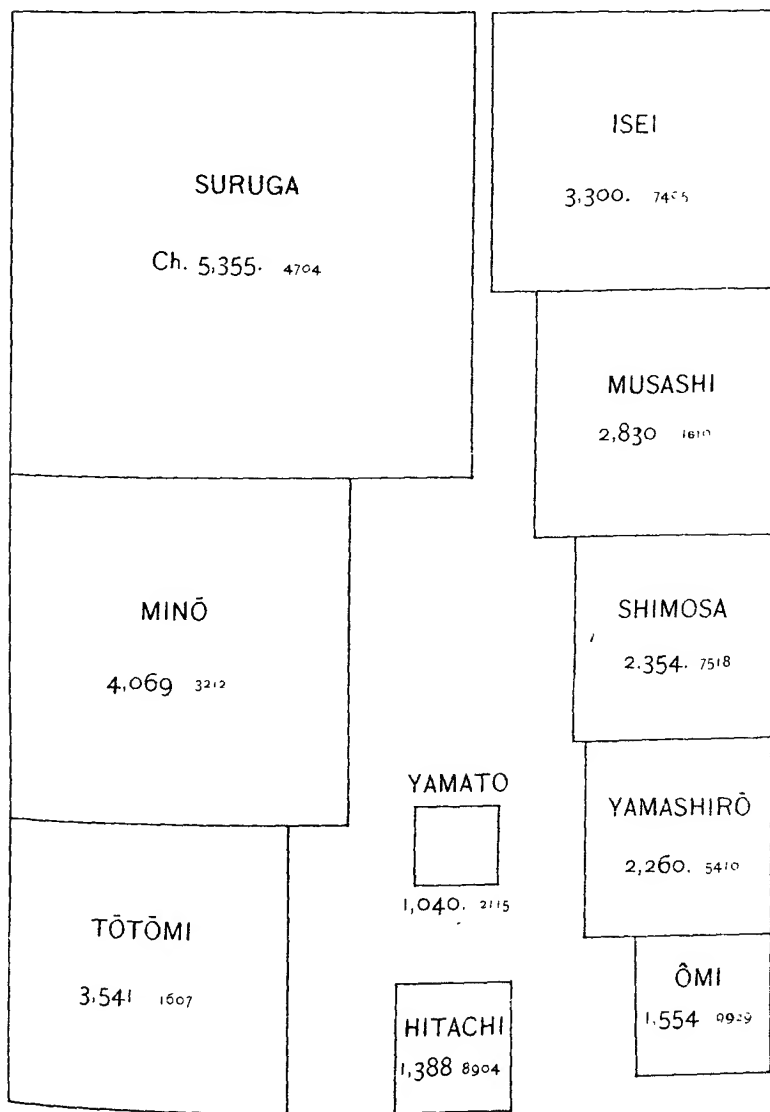


TABLE SHOWING THE COMPARATIVE EXTENT OF THE  
LAND BEARING TEA.

Total: cho 42,023 8705

TABLE SHOWING THE PROPORTION OF TEA PLANTATIONS  
TO THE WHOLE SURFACE OF CULTIVATED LAND.

<i>Ages of Plants.</i>	<i>cho.</i>	<i>Per Cent.</i>
<i>1 to 3 Years.</i>	2,341. 9501	5.58
<i>4 Years.</i>	2,044. 6426	4.87
<i>5 to 6 Years.</i>	4,378. 0921	10.40
<i>7 to 8 Years.</i>	6,101. 0607	14.52
<i>9 to 10 Years.</i>	5,136. 2526	12.22
<i>11 Years and upwards.</i>	17,413. 8024	41.44
<i>* Estimate</i>	4,608. 0420	10.97

A 10x10 grid with the top-right 2x2 squares shaded.

\* (The amount of land in the Estimate is calculated upon the number of Tea plants cultivated on the borders of gardens and fields.)

1

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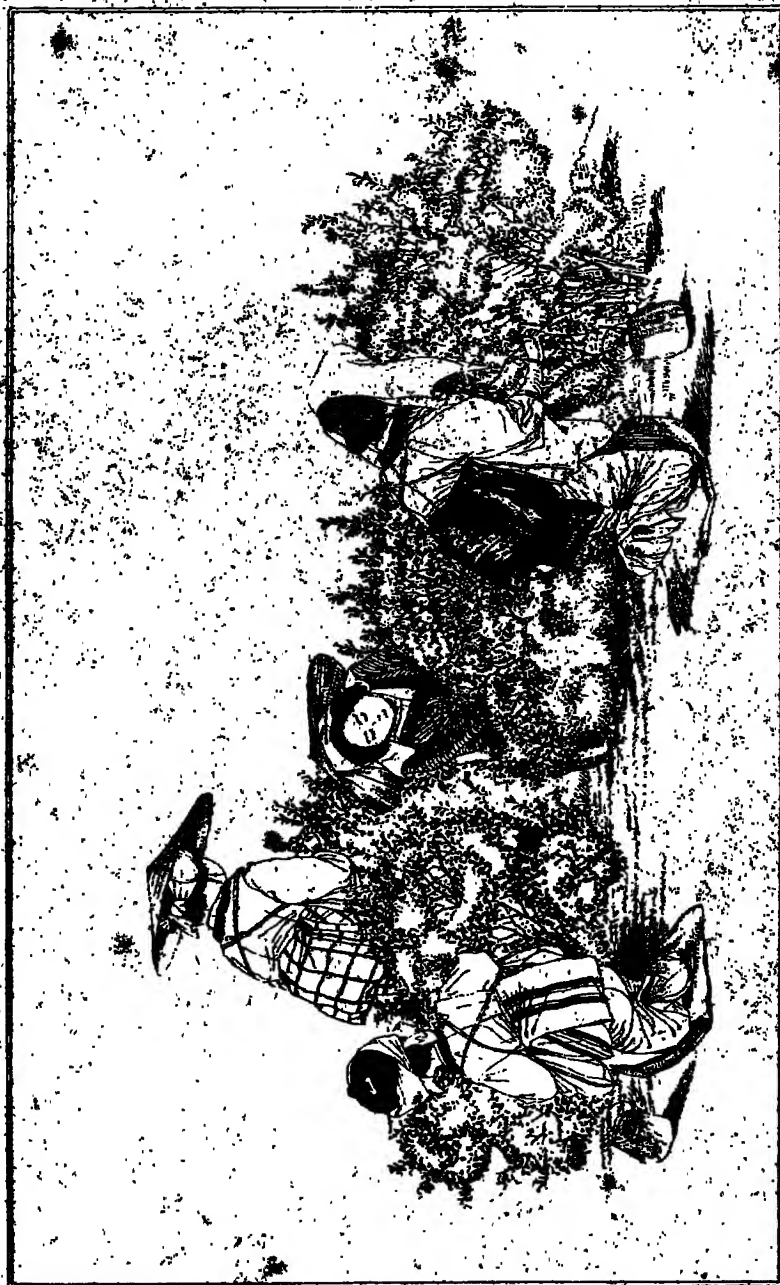
## ERRATA.

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- Illustration No. 5. For *Fukashi sheiro* read *Fukashi seiro*.  
“ 11. “ *Shiōachi mi* “ *Hidashi mi*.  
“ 15. “ *Cha sutē baka* “ *Cha sutē bako*.
- 

NOTE.—The first eighteen of the following illustrations show the consecutive processes of the Country Preparation of Japan Tea: the last three apply to its manipulation by foreign merchants at the treaty ports.

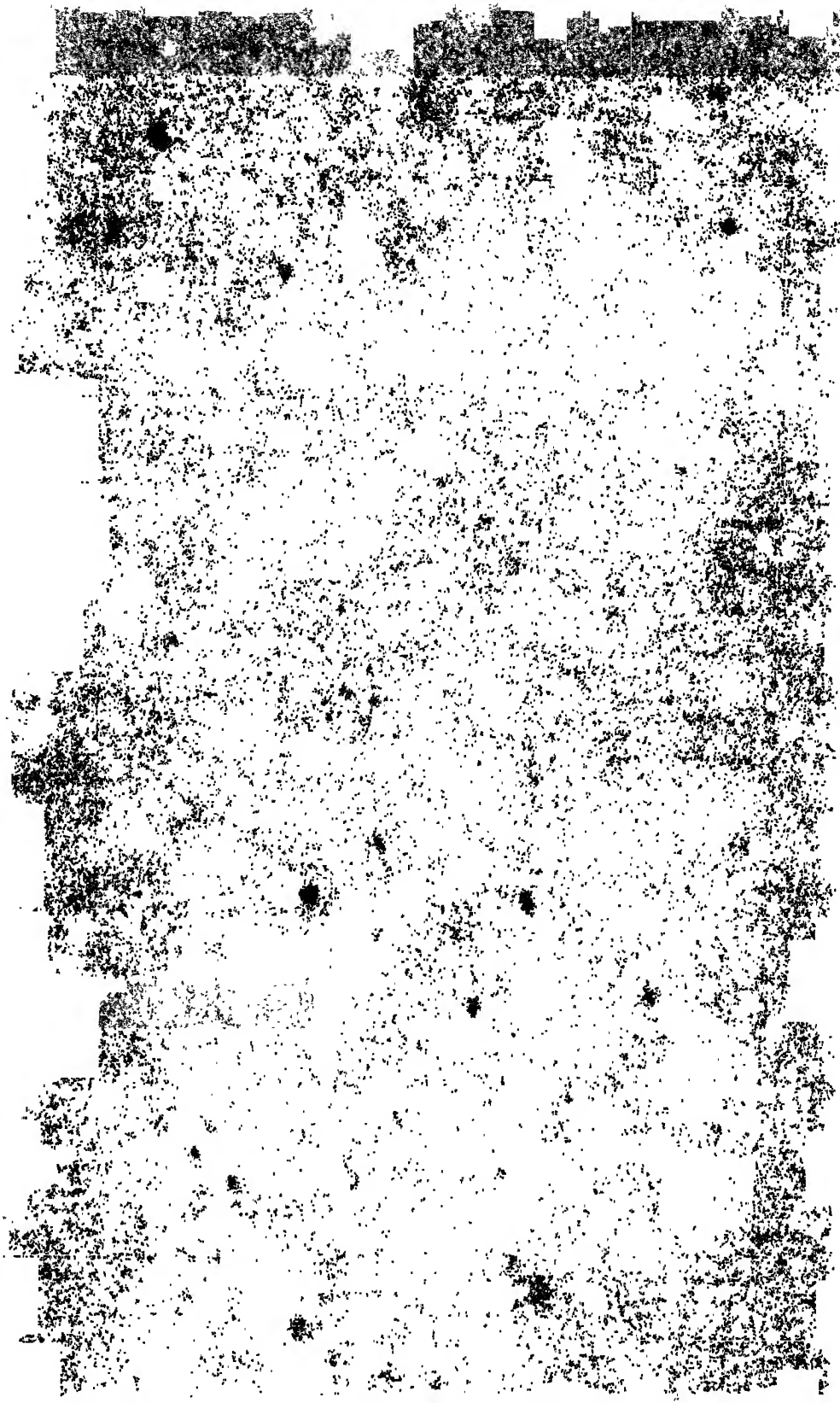




TRANSACTIONS OF THE ASIATIC SOCIETY OF JAPAN

# PICKING

R. MURLEIGH, & CO., LITH. NO. 90 WATER ST., BOSTON



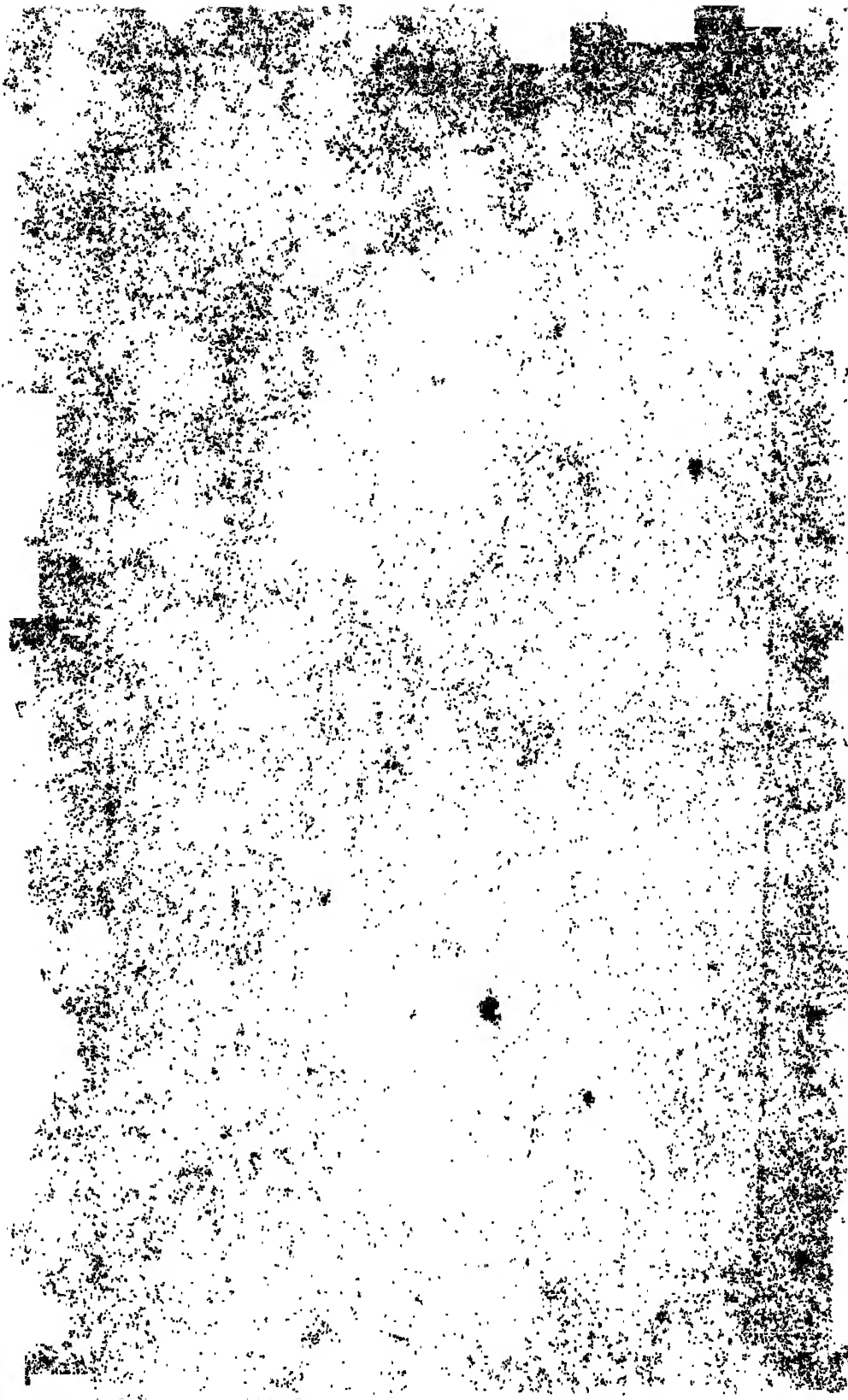


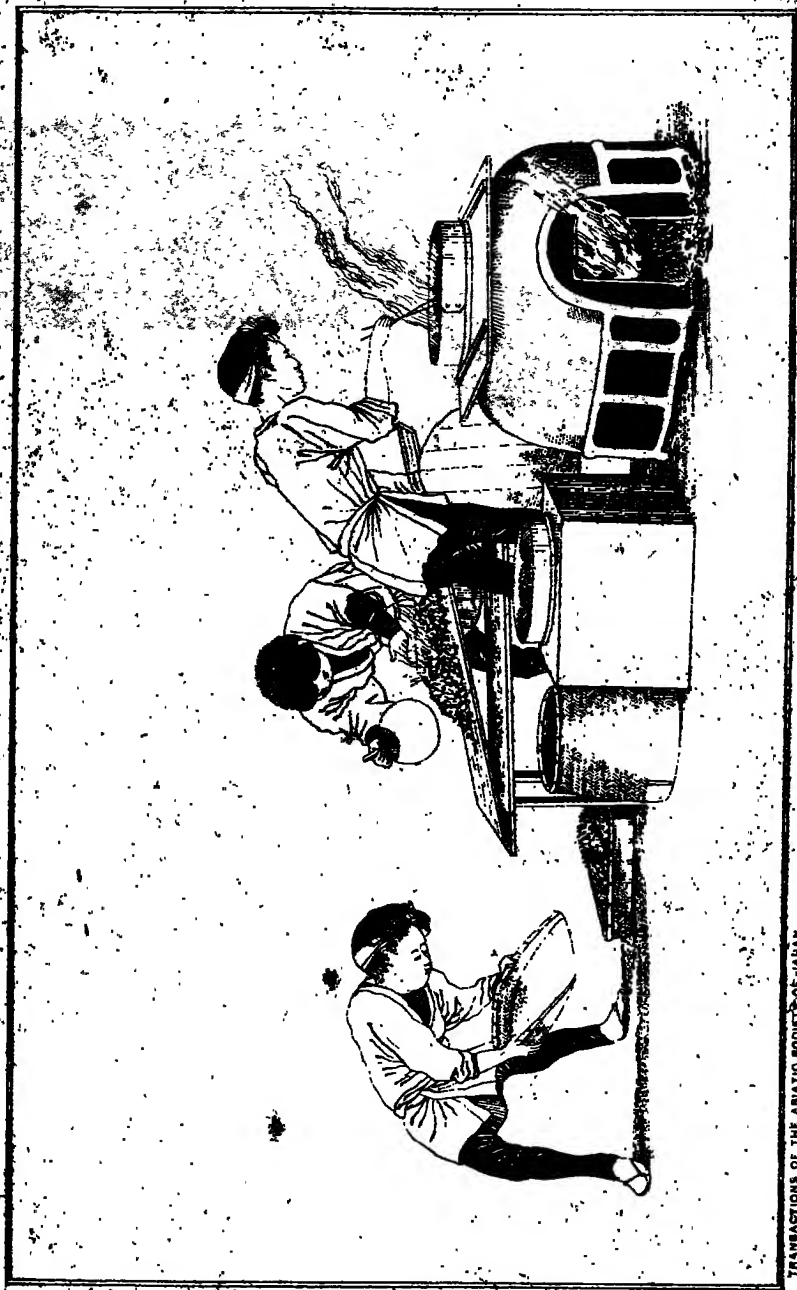


THE NATIONAL MUSEUM OF JAPAN

COLLECTING AND CARRYING TO MARKET

SHIBUYA, A.G. - LITH. NO. 26 WATER & POWER

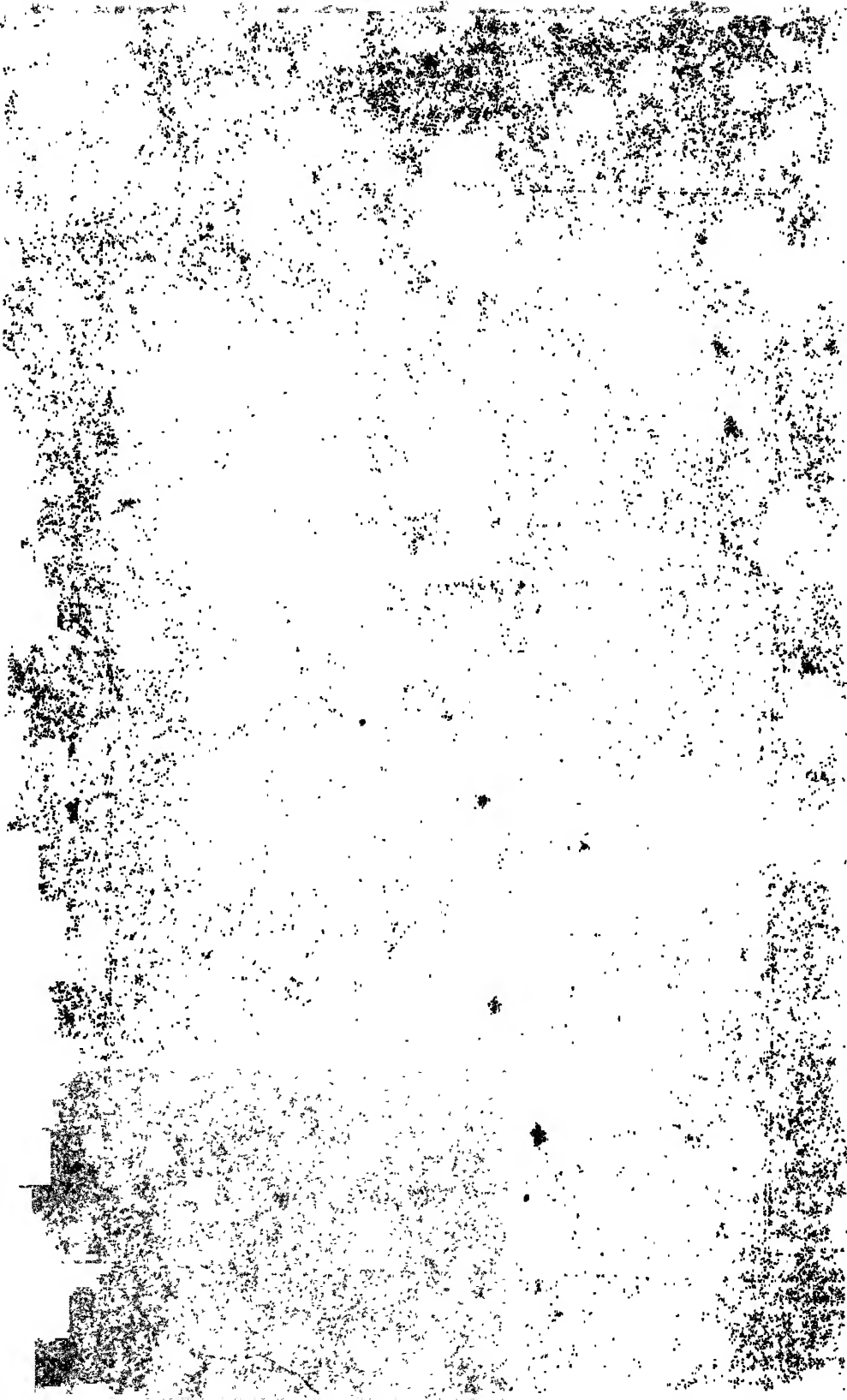


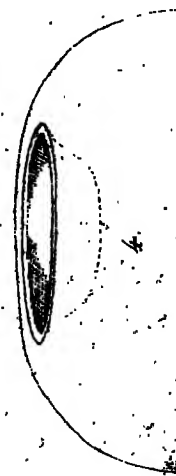
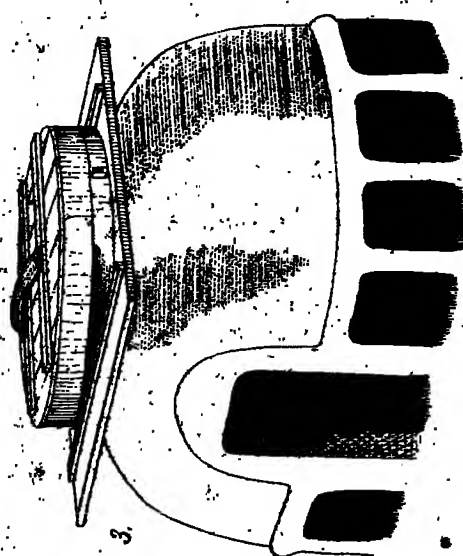
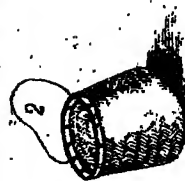
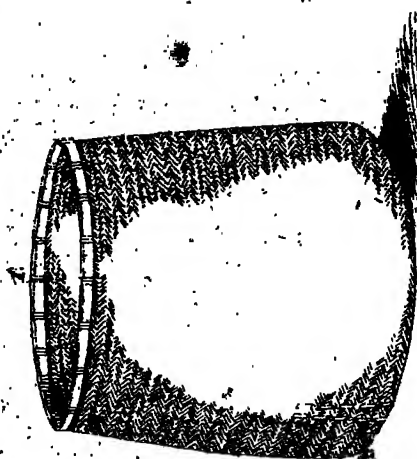


TRANSACTIONS OF THE ASIATIC SOCIETY OF JAPAN

## STEAMING

W. MINKLONN & CO., LITH. NO. 26 WATER ST. YOKOHAMA.

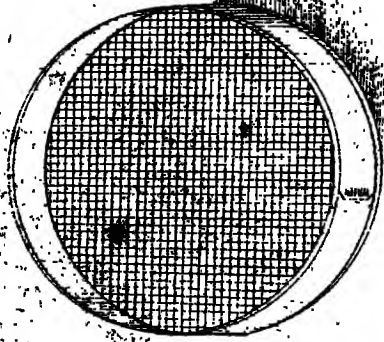




TRANSACTIONS OF THE ASIATIC SOCIETY OF JAPAN. H. MULLIGAN & CO. LITH. NO. 13 WATER ST. BOSTON.

CARRYING BASKET (1) ON MATS. 2. SMALL BASKET used in the fields ("Cka-biku").  
3. STEAMING PAN used in the fields ("Fakashi-kama"). 4. SECTIONAL VIEW OF No. 3.





TRANSLATIONS BY THE ASIATIC SOCIETY OF JAPAN

1. SMALL HAND BROOM ("Miyado boki") 2. SMALL HAND BASKET for sorting ("Maki")

3. SIFTING-BEAM (this was used for sifting top of soyen ("Fumashi shiro") 4. LID for No. 3

5. MEKLETON & CO. LITHO. NO. 80. WATER & WOODMAN





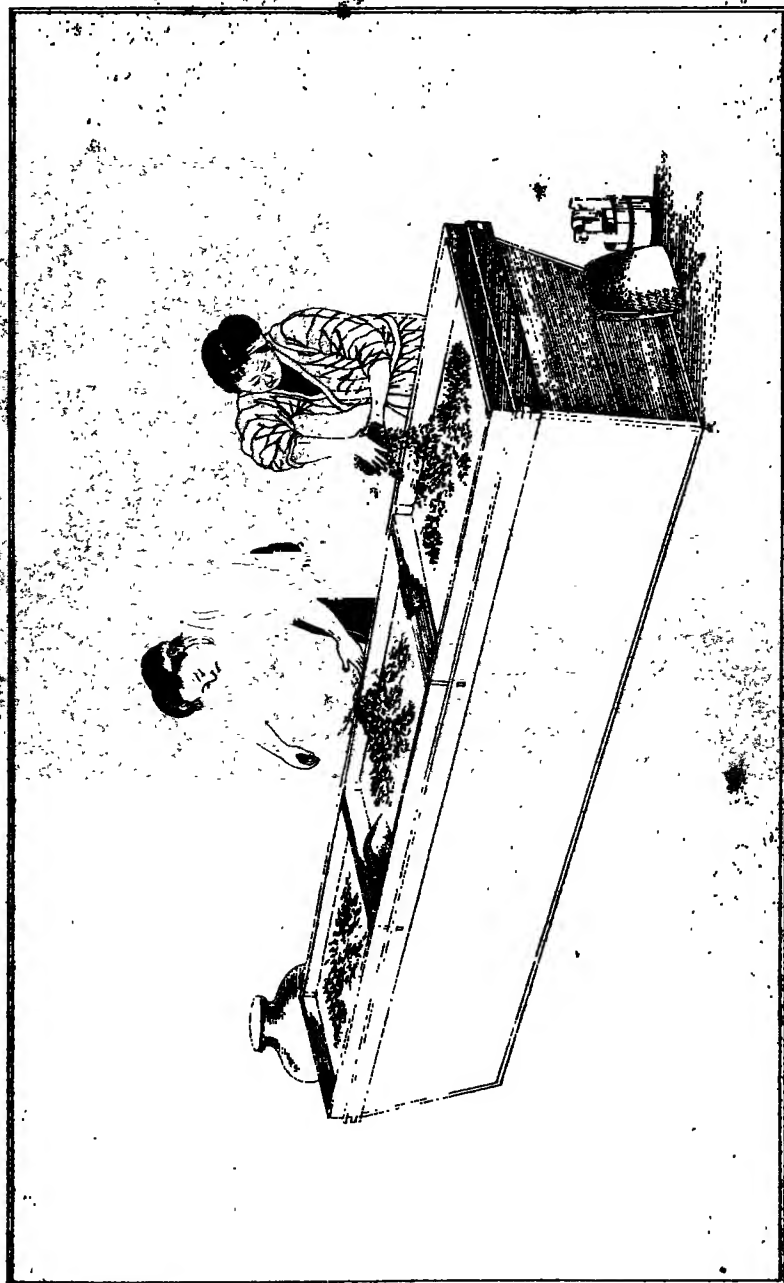


TRANSLATIONS BY THE ASIATIC SOCIETY OF JAPAN.

# PREPARATORY TO FIRING

R. MEIKALJOHN & CO., LITH. NO. 35 WATER ST. YOKOHAMA.



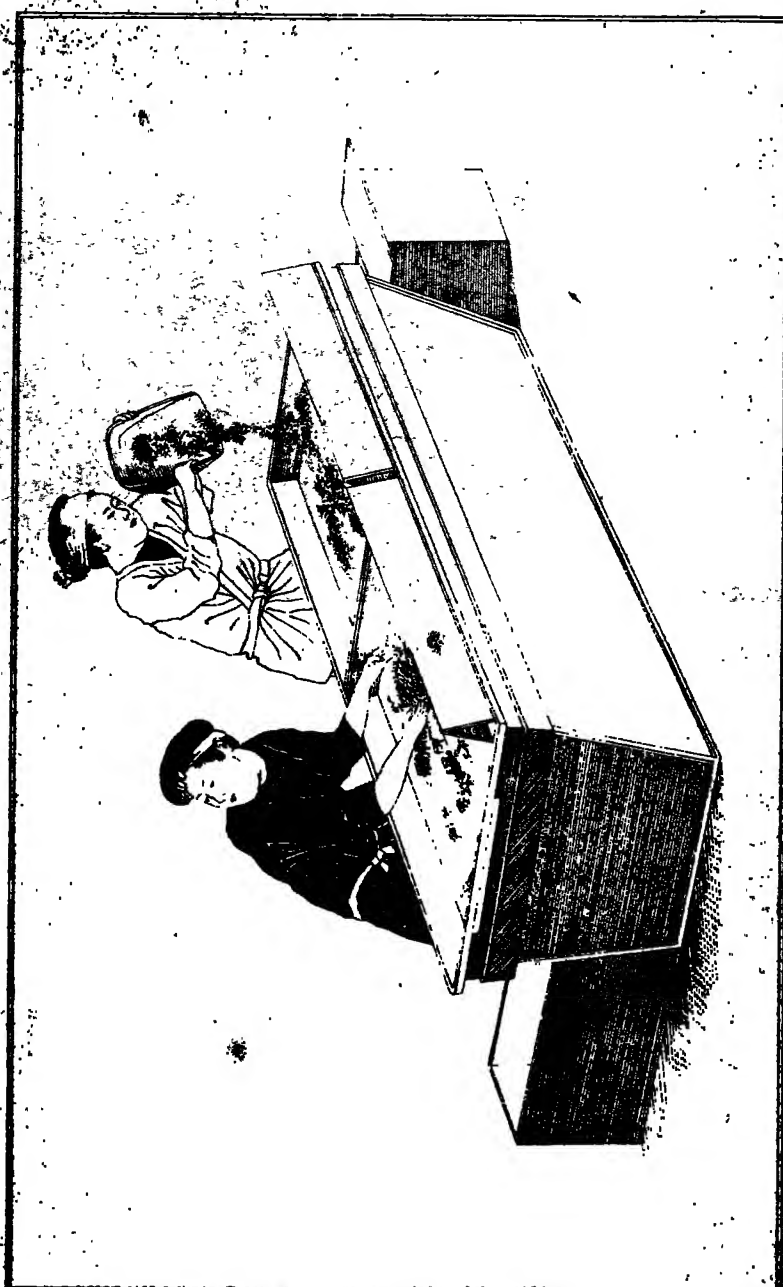


TRANSACTIONS OF THE ASIATIC SOCIETY OF JAPAN

## FIRST FIRING

R. MINKLETON & CO., LITH. NO. 35 WATER ST. YOKOHAMA



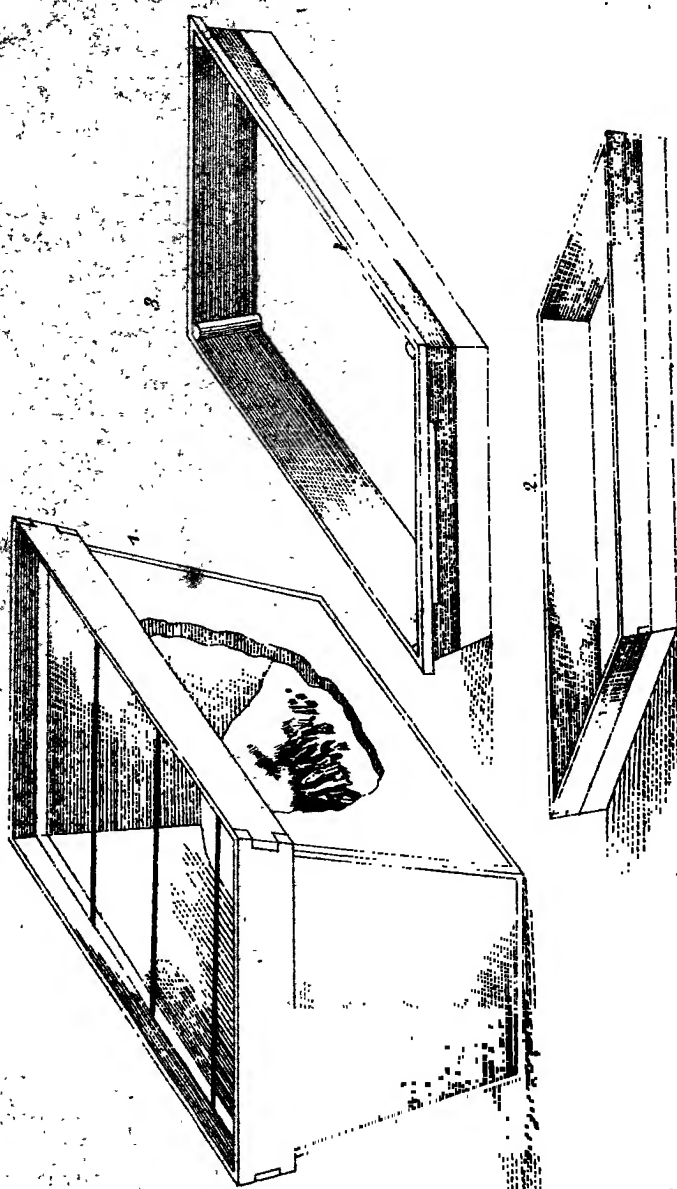


TRANSACTIONS OF THE ASIATIC SOCIETY OF JAPAN

## FINAL-FIRING.

R. MEUKLEJOHN & CO., LITH. NO. 20 WATER ST. YOKOHAMA.





TRANSACTIONS OF THE ASIATIC SOCIETY OF JAPAN.

R. MEIKLEJOHN & CO., LTD. NO. 35 WATER-ST. YOKOHAMA.

- 1. FIRING BOX ("Hojo")
- 2. PAPERED FIRING TRAY, fitting top of firing box ("Shitate no jotan")
- 3. PAPERED FIRING TRAY for final firing ("Shiage no jotan")





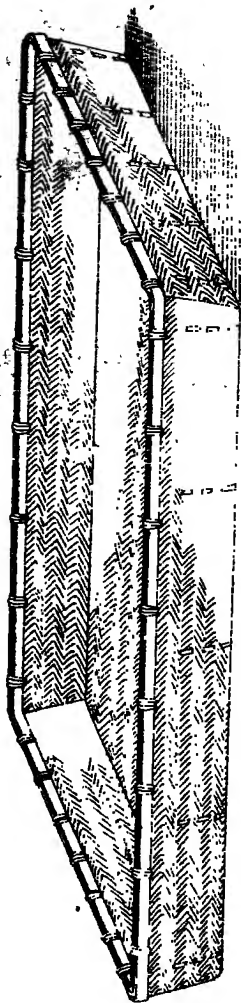


TRANSACTIONS OF THE ASIATIC SOCIETY OF JAPAN

## SORTING.

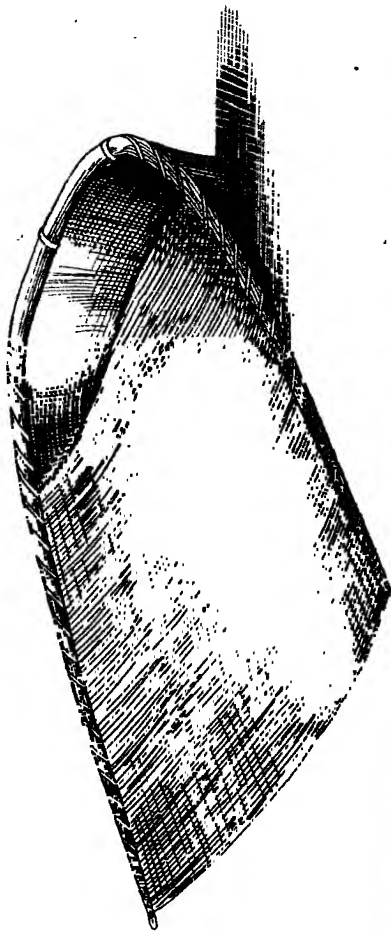
R. MEIKLEJOHN & CO., LTD., NO. 25 WATER ST. YOKOHAMA.





1.

2.

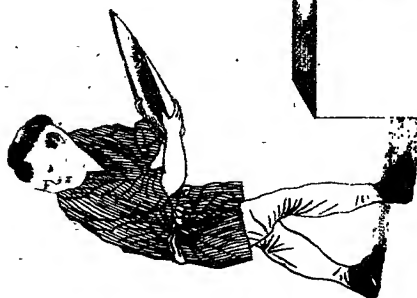
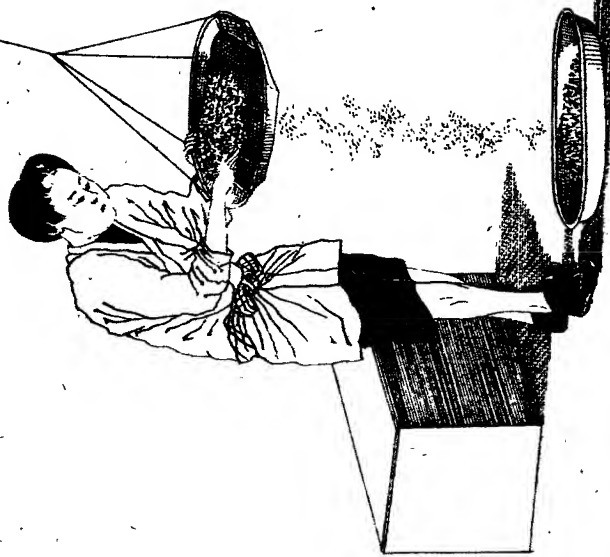


TRANSACTIONS OF THE ASIATIC SOCIETY OF JAPAN.

R. MENDELSON & CO. LITH. NO. 25 WATER ST. YOKOHAMA

1. SQUARE BASKET, "Kaku bara" 1. 2. BASKET FOR SORTING, "Shidachi mi" 1.



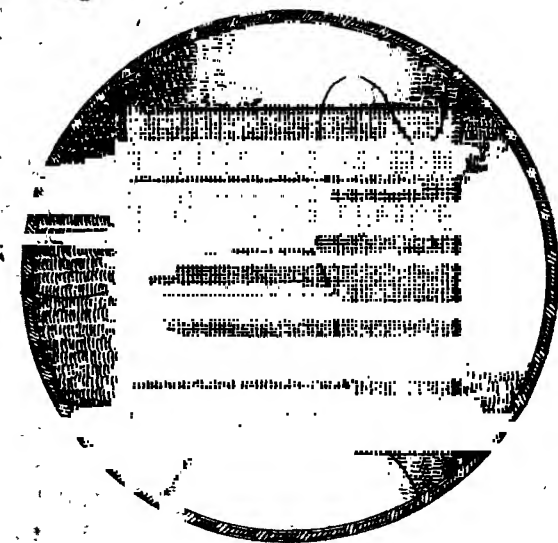


TRANSACTIONS OF THE ASIATIC SOCIETY OF JAPAN

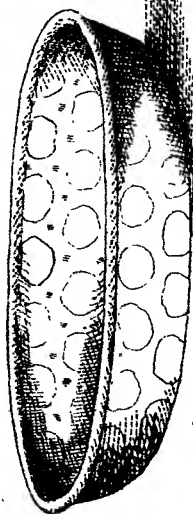
## SIFTING

W. MEIKEDJOHN & CO., LITH. NO. 36 WATER ST. YOKOHAMA.





3.



MANUFACTURED BY THE ASIATIC SOCIETY OF JAPAN  
 1. SIEVE (Fig. 1) 2. SIEVE (Fig. 2) 3. ROUND BASKET (Fig. 3)  
 R. MEIKLE JOHN & CO., LTD. 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100. LITH. NO. 25 WATER ST. YOKOHAMA.



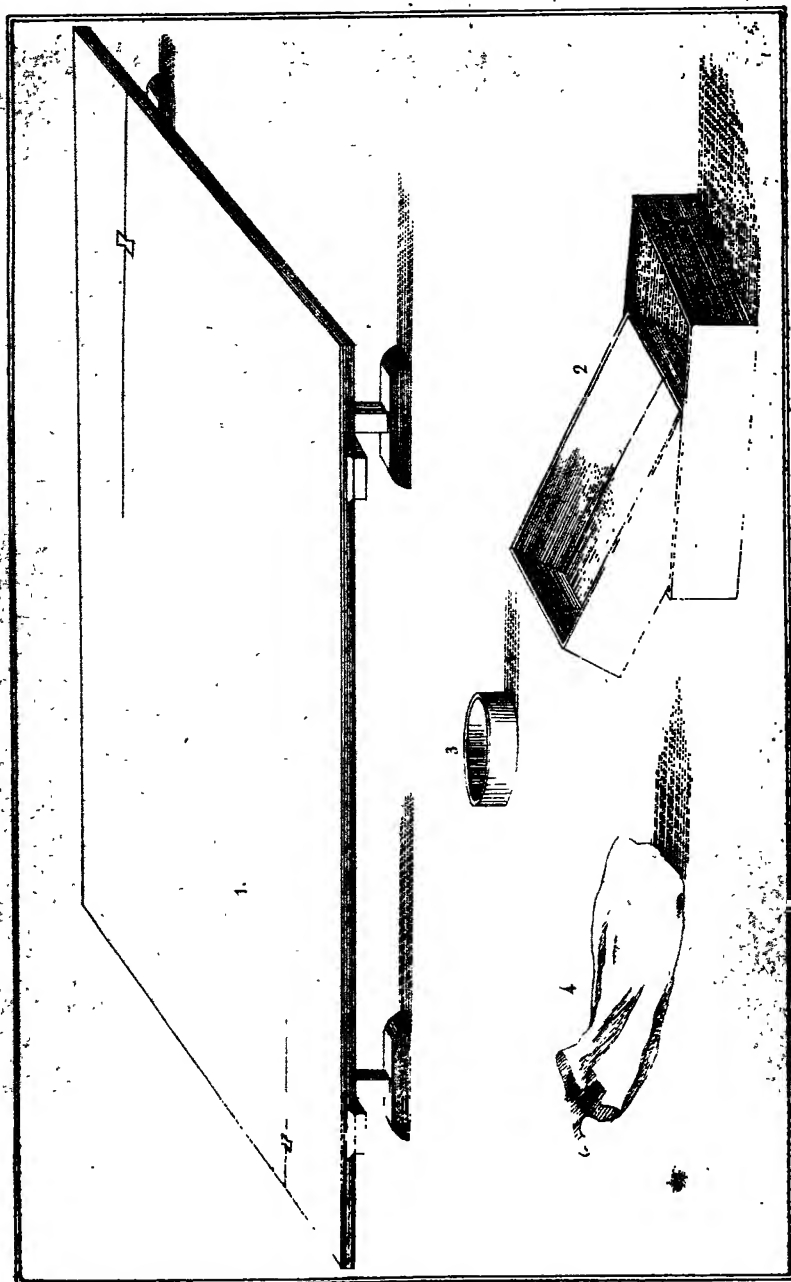




TRANSACTIONS OF THE ASIATIC SOCIETY OF JAPAN. 2. R. MEIKLEJOHN & CO., LITH. NO. 20 WATER ST. YOKOHAMA.

# HAND PICKING.



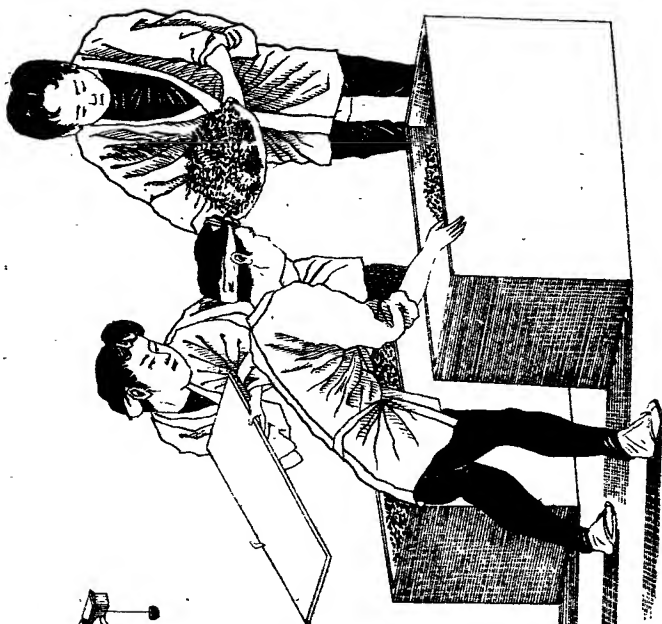
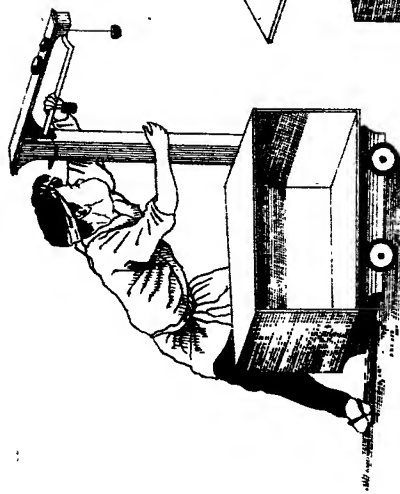


U. S. PATENT OFFICE, WASHINGTON, D. C. 20540

TRANSACTIONS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

1. PICKIN (Yan dai) 2. TRAYS for rejected leaves ("Cha suté baka").  
 3. PLATE (Kibei) 4. BAG for yellow leaves ("Kiba bukuro").



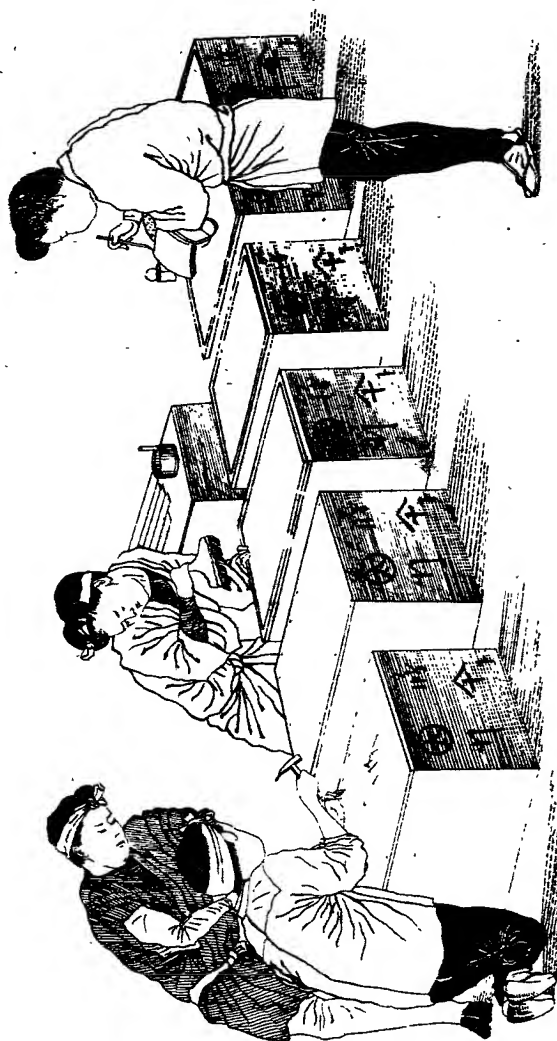


TRANSACTIONS OF THE ASIATIC SOCIETY OF JAPAN

# WEIGHING AND PACKING.

R. MEIKLEJOHN & CO., LITH., NO. 26 WATER ST., YOKOHAMA.





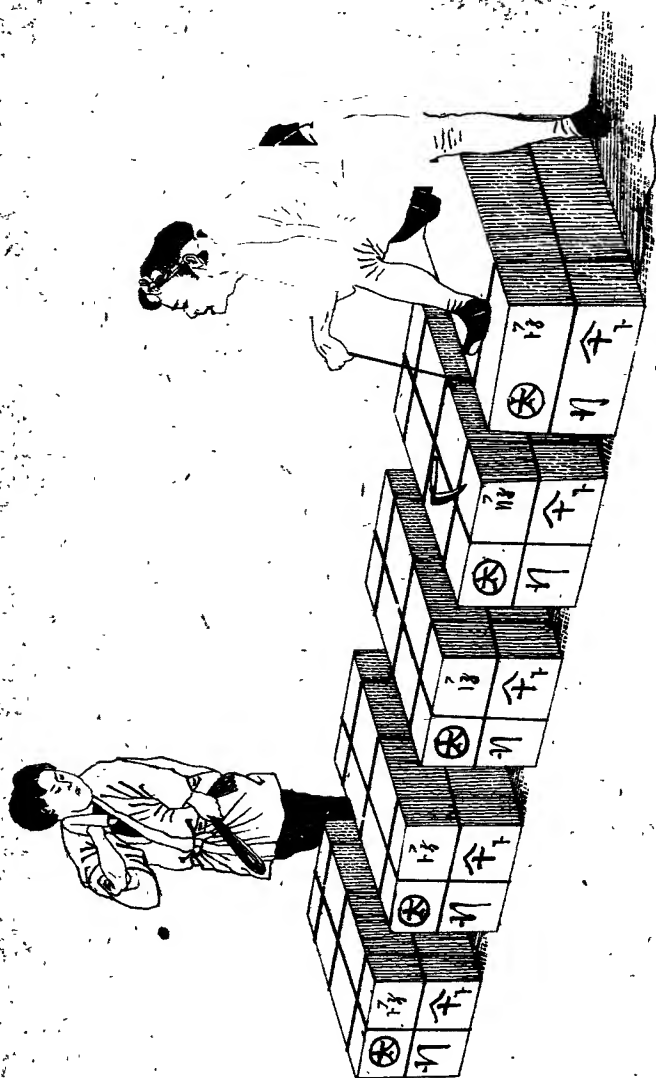
TRANSACTIONS OF THE ASIATIC SOCIETY OF JAPAN

## PACKING AND MARKING.

R. MEIKLEJOHN & CO., LTD. NO. 26 WATER ST. YOKOHAMA.







TRANSACTIONS OF THE ASIATIC SOCIETY OF JAPAN

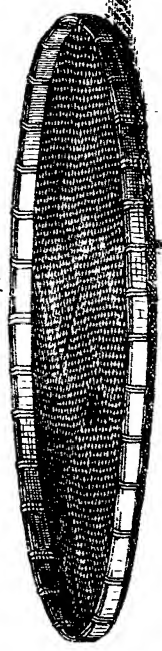
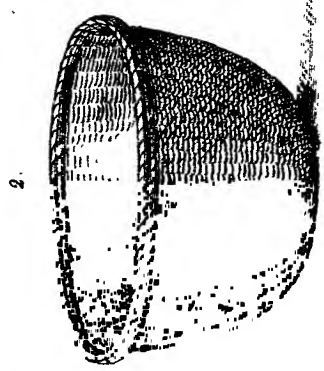
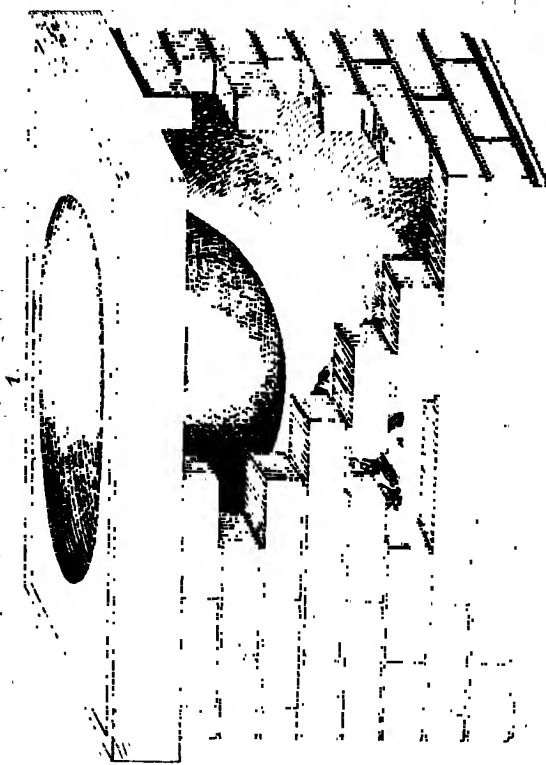
ROBING AND FINISHING

R. MEIKLEJOHN & CO., LITH. NO. 35 WATER ST. YOKOHAMA.







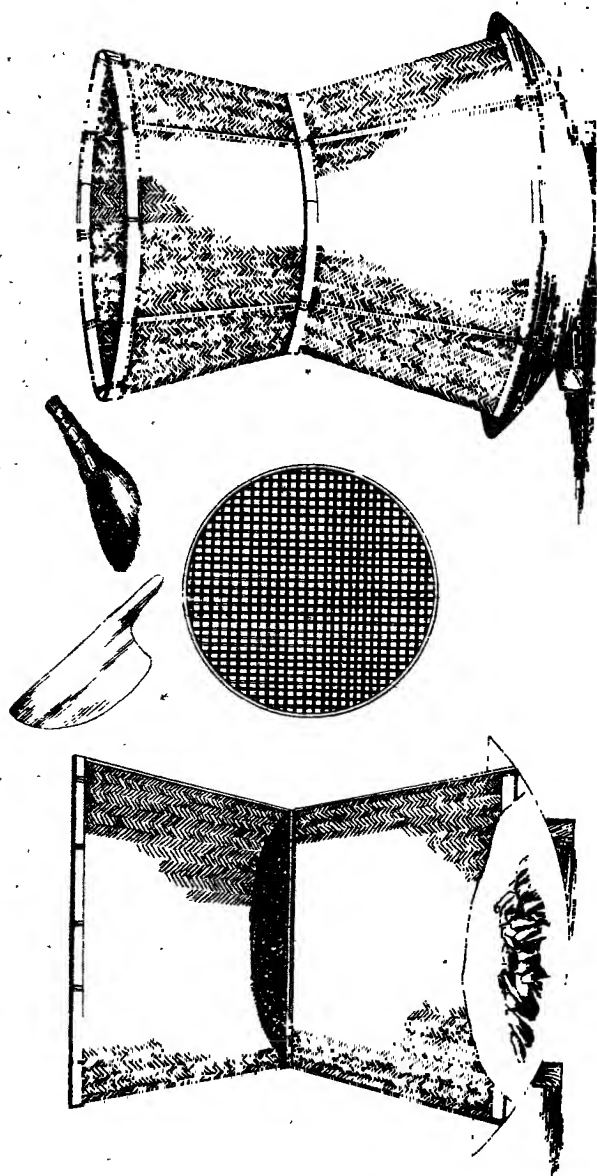


TRANSACTIONS OF THE ASIATIC SOCIETY OF JAPAN.

R. WEIKLEJOHN & CO., LITH NO. 26 WATER ST. YOKOHAMA

1. FIRING PAN set in brick work and plaster.
2. CARRYING BASKET for taking tea to the pans.
3. HAND SCOOP for removing the tea from the pans.
4. SIEVE.





R. MINALLOON & CO. LTD. NO. 26 WATER ST. YOKOHAMA

TRANSACTIONS OF THE ASIATIC SOCIETY OF JAPAN

# BASKET FIRING.

General view and section of basket, centre way for receiving the fire small bloom and fan.





## DISCUSSION.

After the President had opened the discussion by a few remarks on the universal use of tea, the influence it has on commerce, on society, and on the wealth of nations, Mr. F. Warrington Eastlake remarked that Mr. Gribble spoke of both *Thea Viridis* and *Thea Bohea*, but according to some recent papers of the German Botanical Society at Berlin he understood that *Thea Viridis* is no longer made a separate species but is spoken of simply as a variety of *Thea Bohea*. Could it not be possible that the *on-cha* and *me-cha* spoken of by Mr. Gribble represent the two forms of *Thea Bohea*? About a year ago the German Government sent to Hongkong for specimens and seeds of the tea-plant, but he believed that the request was for *Thea Bohea* and any other varieties known to the Chinese.

Mr. Gribble understood that the *on-cha* and *me-cha* are both offspring of one and the same plant, and that the tea-planters never knew beforehand which variety would be produced by the young plant.

Dr. Divers said that botanists appeared to recognise only two species, or at least very distinct varieties, of *Thea*,—*T. Sinensis* and *T. Assamiensis*. Indian tea was now gathered almost exclusively from a hybrid of the Chinese and Assam species. He had brought with him, as likely to prove of interest to the meeting, a specimen of *caffeine* or *theine* which he had had prepared from Japan tea by one of the students of the Imperial College of Engineering. He might mention that the injurious effects of too much tea-drinking were not of such an imaginary character as might be supposed from Mr. Gribble's introductory remarks. These effects were often apparent in many of the women attending as out-patients at the London hospitals; and with those patients it was often of as much advantage to stop their tea for a time as it was to check the use of alcoholic drinks with others.



## A CATALOGUE OF THE LEPIDOPTERA OF JAPAN.

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By H. PRYER.

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(Continued from Vol. XI. Part II. page 242.)

The second part of the list contains the *Ægeridæ*, *Bombycina*, *Noctuities* and *Geometrina*. I regret that my intended departure from this country prevents my carrying out the work in a thorough manner, and hope my readers will excuse the many errors which will, I am afraid, be only too apparent.

I am not all satisfied with the position assigned to many of the Japanese moths, and mention a few that I think require special attention at the hands of Entomologists, particularly my Japanese friends, who have in the fauna of this country a wonderful field of research at their command.

*Deroca phasma*: the larva of this should be searched for, and its habits and form studied before its family affinities can be definitely settled.

*Schistomitra funeralis*: the larva of this should also be obtained. I believe it to be a *Geometra*, but in deference to Mr. Butler's opinion retain it in the *Chalcosiidæ*.

*Thyris usitata* probably a *Pyralis*.

*Belosticta extensa*.

*Psychostrophia melanargia*.

*Datanoides fasciata*.

Many of the families I believe are in a very unsatisfactory state, and think they require careful revision. Among the *Geometra*, for instance, I find many species which are incongruous with other

species in the group. The divisions in the family *Acronycta* proposed by Mr. Butler I do not all agree with, and hope to treat the subject in a separate paper. I think the wonderful diversity of form in the larva of this family is explained by the fact that, while the greater part of the *Noctuities* are concealed or nocturnal in their habits, the members of this family are conspicuous and generally diurnal feeders. The *Larentiidae* is far too extended and includes a number of forms which could advantageously be divided.

I have not attempted to place the families enumerated in any definite order, and leave this task to be undertaken in the next edition, which I intend to render much more complete in every respect. I hope to carry this out on my return next year.

I have still a large number of species unnamed, and many of them I have not had time to work out; the position assigned to these in this list I do not intend to be taken in any way as an indication of their affinity to the others already identified.

I believe some of the errors pointed out in Mr. Butler's identifications to have arisen from the tickets on the specimens sent him having been transposed, and from worn and single specimens only having been sent to him to identify.

The *Pyralidina*, *Tortricina*, *Tineina* and *Pterophorinae* I have not yet attempted to catalogue. I have considerably over 1000 species of these groups. The *Pyralidina* appear to be endless. I have seldom gone out searching for them without obtaining forms new to me, and they vary to a most puzzling extent. Within a radius of four miles from Yokohama I have taken more species than are contained in the whole of Great Britain, notwithstanding that the *Eudoria*, which are represented largely in England, are conspicuous here by their absence, and there are only one or two of this genus at all common.

To show the extent of the task before the Entomologist in this country, I give a comparative table of the *Lepidoptera* of Great Britain as given in Stainton's Manuel and this list. There are, I am convinced, many more species yet to be found here, and I do not believe I have met with more than two-thirds of the Japanese *Lepidoptera*. A visit of a few days to the mountains is always productive of a host of new wonders.

	Species in Great Britain	Species in Japan.
<i>Rhopalocera</i> .....	66.....	140
<i>Sphingidæ</i> .....	17.....	29
<i>Ægeridæ</i> .....	13.....	14
<i>Bombycina</i> .....	107.....	210
<i>Noctuities</i> .....	294.....	344
<i>Geometrina</i> .....	272.....	388
	<hr/> 769	<hr/> 1,120

I find there is a tendency on the part of describers to multiply both genera and species unnecessarily, instead of using every means to identify them with known species, thus entirely defeating the very end and aim of all scientific classification, besides obscuring and confusing the wonderful facts to be drawn from geographical distribution; rendering correct generalization a hopeless task, no sufficient allowance is made for the influence of temperature, migrations voluntary and forced, and the varied external influences which beset insect life during its existence. There is also a want of care shown in sufficiently investigating the amount of individual variation which is present to an extraordinary degree in Japanese insects. Any trifling variety is seized upon to form a "new species." In one case I find that a species has been thrice described in two different genera, and another twice described in two different groups.

Classification by neururation in *Lepidoptera* has received deservedly much attention of late years, but unless carried out in an exhaustive instead of spasmodic manner, and pursued without due attention to other equally important characters will, I think, result in a vicious artificial system, of no value to the naturalist. I would specially call the attention of the 'Neurationists' to the fact that the Neuroptera frequently exhibit in the same specimens, veinlets differing in number and shape on opposite sides of the wings.

There is an interesting point in the Japanese fauna which I think gives us instructive information regarding the manner this country was originally populated. I call it for convenience 'duality.' We frequently find two or more 'species closely resembling each other in form and habits. This I think indicates waves of immigration from different

points. Geological investigation proves the greater part of this country to be remarkably recent in its formation, traces of the older strata being generally confined to the central mountain chain. This and other facts tell us that Japan has received her fauna recently from America, Siberia, and Southern Asia. Mr. Blakiston has touched upon this point in our Transactions, Vol. XI, Part I, page 126, showing the possible influence of a cold period in driving the inhabitants of the far north into South Japan. But there has also been one or more migrations *from* the South and West, and these facts should be fully borne in mind by the describer when undertaking the task of describing a "new species."

The excess of descriptive literature is very annoying to the student who endeavours to grasp the grand facts and laws of Nature. A good plate like those beautifully executed ones of Mr. Butler's in the *Lepidoptera Heterocera* in the British Museum are worth volumes of description. Mere descriptions become excessively wearisome to those who cannot sympathise with the superlative interest attached by the god-father of some abused little insect that has strayed into the hands of Mr. 'Somebody' who 'calls it names,' but whose purile labours will so soon be forgotten.

In the Annals and Magazine of Natural History for November, 1877, Mr. Butler heads his paper by a statement that the species described therein are from a 'collection of moths made at Yokohama by Mr. Jonas.' This is inexact. Many of the specimens described were from my collection, and a still larger proportion were collected by Mr. F. J. C. Christy, whose collections Mr. Jonas purchased on Mr. Christy's departure from Japan.

#### ABBREVIATIONS.

- B. M.=Lepidoptera Heterocera in the British Museum Parts 2 and 3.  
 A. M.=Annals and Magazine of Natural History.  
 E. S.=Transactions Entomological Society of London.

#### ÆGERIDÆ.

##### 82. SPHECIA ? sp.

Yokohama, antennæ of the male pectinated.

##### 83. SPHECIA ? sp.

Yokohama, antennæ of the male also pectinated.

34. *SPHECIA* ? sp.  
Yokohama ; feeds on oak.
35. *SPHECIA CONTAMINATA*, But.  
Yezo.
36. *TINTHIA* ? sp.  
Nikko.
37. *TINTHIA EDITHA*, But.  
Fig. 9, M. B. 2, Pl. 40, p. 61.
38. *TINTHIA CONSTRICTA*, But.  
Fig. 10, M. B. 2, Pl. 40, p. 61.
39. *SCIAPTERON* ? sp.  
Yezo.
40. *SCIAPTERON REGALE*, But.  
Yokohama ; this feeds on the wild grape vine, causing large oval swellings 1 to 3 inches long in the stem. It is the only one of this family I have as yet bred. It is moderately common, and a few hours search will always be rewarded by a number of the larva, which, if nearly full fed, can easily be reared.
41. *ÆGERIA HECTOR*, But.  
Yokohama : feeds on cherry.
42. *ÆGERIA* ? sp.  
Yezo, Nikko and Yokohama.
43. *ÆGERIA* ? sp.  
Atami.
44. *ÆGERIA* ? sp.  
Yokohama.
45. *ÆGERIA TENUIS*, But.  
Plate 15, fig. 8, M. B. 2.

EURIPIDÆ.

46. *THYRIS USITATA*, But., 252 A. M. Nov. 1879, p. 367.  
Yokohama ; I am uncertain where to place this puzzling little insect. Mr. Butler places it among the Noctua after Authopilidæ. It is a very swift day-flyer, flying in the hottest sunshine, when it looks like a *Pyralis*—

and it may possibly be *Einnychidæ*. I have placed it after *Ægeridæ*, temporarily, until I have an opportunity of studying its life history more closely.

## **Bombycina.**

### COSSIDÆ.

47. *BIRETA PALLIDA*, But., B. M. 2, p. 12, Pl. 25, f. 10, 11. A. M. Nov. 1877, p. 12.

Very abundant, Yokohama, feeding in the stems of the *Kayeya* (a tall coarse grass). There are two forms, one being narrower in the fore-wing than the other. Mr. Butler places this among the *Notodontidæ*.

48. *BIRETA*? sp.

1 specimen, male, from Ohoyama, very like the preceding species, but with enormously large pectinate antennæ.

49. *PHRAGMATECIA ARUNDINIS*.

One specimen, Yokohama, taken on a gas lamp at Noge Yama.

50. *ZENZERA ÆSCULI*.

One specimen from Fujisan, taken by Mr. Maries; I have seen it also in Tosa.

51. *COSSUS*? sp.

I have seen the larva of a *Cossus* here but have not taken the perfect insect; the larva were small but exactly like *C. Ligniperda*.

52. *GORGOPHIS NIPHONICA*, But. A.M., Nov. 1879, p. 357.

I have specimens taken at the foot of Ohoyama.

53. *HEPIALUS HECTUS*.

Yezo.

54. *PHASSUS* or *HEPIALUS SINENSIS*, Moore.

Yokohama; emerges in the summer; rather scarce.

55. *HEPIALUS ÆMULUS*, But. B.M. 2, p. 20, P. 27, f. 8. A.M. Nov. Nov. 1877, p. 21.

*Excrescens*, But. B.M. 2, p. 20, P. 27, f. 7, A.M. 1877, p. 21.

Yokohama, very abundant; it emerges late in the autumn; large specimens measuring  $4\frac{1}{2}$  to 5 inches in expanse; it is very destructive, particularly to imported fruit trees, in the stem of which it burrows



two years; it is extremely prolific; the body of a full sized female is two inches long, filled with minute eggs which it scatters loosely about the trees it feeds on; I have found it in almost all trees except conifers: it often attacks vines and prefers to burrow in the stem of a tree to which a wisteria or other climber is attached. The ichneumon that preys upon this insect is a most extraordinary one: the body is short and oval and measures  $\frac{1}{2}$  an inch, but the ovapositor is 9 inches long, expanse of wings  $1\frac{1}{2}$  inch.

#### LIMACODIDÆ.

##### 56. LIMACODES ? sp.

Yokohama, Yamato; feeds on the pear.

##### 57. MONEMA FLAVESCENS, But. B. M. P. 14, Pl. 25, f. 5.

Yokohama; feeds on the celtis and elm; forms an oval, very hard and smooth cocoon, mottled with white and brown, very much resembling a bird's egg; the larva spins up in the autumn but does not change to pupa until spring.

##### 58. PARASA SINENSIS.

Yokohama; feeds on keyaki and plum; the larva is a strange mixture of color; the body is a bright apple-green with a dorsal line, light pink boarded with azure blue, and the fore segments bear four spiny warts, the hind segments three; legs almost invisible. Altogether it has a most strange appearance.

##### 59. PHRIXOLEPIA SERICEA, But. B. M. 3, p. 11, Pl. 43, f. 6. A. M. Nov. 1877, p. 15.

Yokohama.

##### 60. PHRIXOLEPIA ? sp.

Yokohama; only differs from the former by being considerably larger.

#### CHLOEPHORIDÆ.

I am quite unable to suggest where to place this puzzling genus. I observe Mr. Butler places two, *Chloephora prasinana* and *quercana*, with the *Notodontidae*.

##### 61. EARIAS CHROMATARIA, Walk.

Yokohama.

62. *EARIAS* ? sp.

Yokohama.

63. *EARIAS* ? sp.

Yokohama.

64. *CHLOEPHORA QUERCANA*.*Hylophila sylpha*, But. B. M. 3, p. 10, Pl. 43, f. 10.

Yokohama.

65. *CHLEOPHORA PRASINANA*.*Hylophila sylpha*, But.

Yokohama.

## 66. ? gn ? sp.

Yokohama ; I believe this to be allied to *Cilex*.

## 67. ? gn ? sp.

Yokohama ; also probably allied to *Cilex*.

## ZYGÆNIDÆ.

68. *ILLIBRIS* ? sp.

Fujisan

69. *ILLIBRIS TRISTA*, Bremer.Or *sinensis*, Walker.

Ohoyama, Kanosan ; distinguished from No. 68, which is blue, by being green.

70. *PROCRIS* ? sp.

Used to be common in the foreign settlement of Yokohama, feeding on masaki.

71. *PROCRIS FUNERALIS*, A. M. Nov. 1879, p. 351.

Yokohama.

72. *BALATEA EGEBIODES*, But. B.M. 3, p. 4, Pl. 42, f. 2.

Ohoyama.

73. *BINTEA GRACILIS*, But. B.M. 3, p. 5, Pl. 42, f. 3.

Yokohama.

74. *NORTHIA TENUIS*, But. M.B. 2, p. 4, Pl. 21, f. 7. A.M. Nov. 1877,  
p. 2.

Yokohama ; feeds on the spindle tree.

75. *NORTHIA* ? sp.

Yokohama.

76. *NORTHIA* ? sp.

Ohoyama.

77. *NORTHIA* ? sp.

Yokohama.

78. *SYNTOMIS THELEBRIS*, Fab.

Varies greatly in size; Ohoyama, Fujisan, Kanosan, always at about 1000 feet elevation.

79. *SYNTOMIS FORTUNEI*, Boid

Yokohama; varies greatly in size; never at any great elevation.

80. *PRYERIA SINICA*, Moore.

Yokohama; feeds on the masaki; abundant late in the autumn, and when on the wing resembles a long-legged wasp (*polistes*.)

81. *ZYGÆNA NIPHONA*, But. M. B. 2, p. 4, Pl. 21, f. 9. A. M. Nov. 1877, p. 1.

I am indebted to Mr. G. Lewis for specimens he took in south Japan. I have never seen it alive.

Mr. Butler states that all the carmine spots of primaries are confluent; this is, however, not invariably the case.

CHALCOSIIDÆ.

82. *ELCYSMA TRANSLUCIDA*, But. E. S. 1881, p. 4.

Yoshino; this flies by day, and the first one I saw flying I took to be a new *Parnassus*; it has long curled tails and is a very peculiar looking insect.

83. *SCHISTOMITRA FUNERALIS*, But.

Nikko, Fujisan. Mr. Butler places this among the *Chalcosiidæ*, but I should not be surprised if it proved to be a *Geometra* allied to *Abraxas*.

84. *PIDORUS ATRATUS*. B. M. 2, p. 9, Pl. 23, f. 9, A.M. Nov. 1877, p. 9.

Yokohama, feeds on the *Uria*.

85. *PIDORUS REMOTA*, B. M. 2, p. 9, Pl. 23, f. 10.

Yokohama, Tokiyo, Nikko. The larva is very similar to the preceding, and I do not see the necessity of placing it in a separate genus.

## NOLIDÆ.

86. NOLA ? sp.  
Yokohama.
87. NOLA ? sp.  
Yokohama.
88. NOLA ? sp.  
Fujisan.
89. NOLA ?  
Ohoyama.
90. NOLA ? sp.  
Yokohama.
91. NOLA ? sp.  
Yokohama.
92. NOLA CANDIDA, But. B.M. 3, p. 9, Pl. 43, f. 3.  
Yokohama.
93. NOLA FUMOSA, But. B.M. 3, p. 9, Pl. 43, f. 2.  
Yokohama.
94. NOLA ? sp.  
Yokohama.
95. NOLA ? sp.  
Yezo.

## LITHOSIIDÆ.

Mr. Butler includes *Cyana decipiens* with the *Lithosiidæ*. I believe it to allied to *Phycidæ*. This species has a curious habit of folding its wings round its body, mimicking a short broken stick, the resemblance being heightened by its light colored head. It is abundant high up Fujisan.

96. ÆMENE MINUTA, But.  
Found on fig tree leaves.
97. ÆMENE ? sp.  
Yokohama.

98. *ÆMENE FASCIATA*, But. B.M. 2, p. 7, Pl. 21, f. 9. A.M. Nov. 1877,  
p. 7.  
Ohoyama, Nikko.
99. *LITHOSIA* ? sp.  
Yokohama.
100. *EUGOA GRISEA*. B.M. 2, p. 8, Pl. 23, f. 1. A.M. Nov. 1877, p. 7.  
Ohoyama.
101. *MILTOCHRISTA ROSARIA*, But. B.M. 2, Pl. 22, f. 8. A.M. Nov.  
1877, p. 5.  
Yokohama.
102. *MILTOCHRISTA ABERRANS* But. B.M. 2, p. 5, Pl. 22, f. 7. A.M. Nov.  
1877, p. 5.  
Yokohama.
103. *MILTOCHRISTA* ? sp.  
Yezo.
104. *MILTOCHRISTA CALIMINA*, But. B.M. 2, p. 22, f. 10. A.M. Nov.  
1877, p. 4.
105. *MILTOCHRISTA TORRENS*, But. A.M. Nov. 1879, p. 353.  
Yokohama.
106. *MILTOCHRISTA* ? sp.  
Yokohama.
107. *MILTOCHRISTA PULCHRA*, But. M.B. 2, Pl. 22, f. 6. A.M. Nov.  
1877, p. 4.  
Yokohama.
108. *MILTOCHRISTA STRIATA*, Brun.  
Yokohama.  
A very variable insect in size, shape and markings ; some female  
specimens are almost entirely without markings.
109. *MELANÆMA VENATA*, But. B. M. 2, p. 6, Pl. 22, f. 5, A.M. Nov.  
1877, p. 5.
110. *LITHOSIA AUREOLA* ?  
Ohoyama.

111. LITHOSIA. ? sp.  
Yezo.
112. LITHOSIA sp ?  
Ohoyama.
113. LITHOSIA PAVESCENS, But. B. M. 2, p. 7, Pl. 22, 23, f. 5 and 12.  
A.M. Nov. 1877, p. 6.  
*Lithosia Lavis*, But.  
Nikko.
114. LITHOSIA ? sp.  
Nikko.
115. LITHOSIA ? sp.  
Yezo.
116. LITHOSIA ? sp.  
Nikko.
117. LITHOSIA ? sp.  
Nikko.
118. LITHOSIA ? sp.  
Yokohama.
119. SYSTROPHA NIVOSA, But. A. M. Nov. 1879, p. 353.  
Yokohama.
120. COLLITA GRISEOLA, Hub. ?  
Yokohama ; always much smaller than English specimens.
121. COLLITA ADAUCTA, But. B.M. 2, p. 6, Pl. 23, f. 6. A.M. Nov. 1877, p. 6.  
Nikko, Yezo.
122. PELOSIA MUSCERDA, Hub. ?  
Nikko, Yezo. Spots generally very indistinct.
123. LITHOSIA ? sp.  
Nikko.
124. SETINA SINENSIS.  
Yokohama.
125. LITHOSIA ? sp.  
Yezo ; a female ; probably a variety of *L. Quadra*, but wanting the four black spots,

126. LITHOSIA QUADRA.

*Æonistis dives*, But. B.M. 2, p. 7, Pl. 22, f. 11. A.M. Nov. 1877, p. 6.

Yokohama, Ohoyama. Mr. Butler has described this under the name of *Æonistis dives*, but I cannot see any reason for distinguishing it from *Quadra*.

127. BIZONE HAMATA, Walk.

Yokohama; one of the most beautiful insects found here; larva common, feeding on the lichen growing on tombstones.

128. NUMENES INTERIORATA

Yokohama; larva gregarious, living under a tough silk web made on the bark of chestnut trees, on the leaves of which it feeds.

CHELONIDÆ.

129. ? gn. ? sp.

Nikko.

130. RHYPARIOIDES SUBVARIA, But. B.M. 2, p. 5, Pl. 23, f. 3.

*Diacrisia subvaria*.

Nikko, Yezo.

131. RHYPARIOIDES NEBULOSA, But. B.M. 2, p. 5, Pl. 23, f. 2, A.M. Nov. 1877, p. 4.

Yezo, Nikko, Ohoyama, once at Yokohama. I believe the foregoing insect to be a form of this species.

132. EUSEMIA JAPANA, Mots.

Nikko, Yezo, Nambu; this beautiful insect is a day flyer.

133. MIMEUSEMIA PERSIMILIS, But. M.B. 2, p. 3, Pl. 22, f. 2.

Yezo. Mr. Butler places this in the genus *Agaristidæ*; it is a *Chelonia* and probably a day-flyer like the preceding.

134. SCHISTOMITRA FUNERALIS, But.

Fujisan, Nikko. Mr. Butler places this among the *Chalcosiidæ*, but I should not be surprised if it proved to be a *Geometra* allied to *Abraxas*.

135. ENTHEMONIA RUSSULA.

Nikko, Fujisan.

## 136. ARCTIA ? sp.

*Euprepia.*

Asamayama.

## 137. ARCTIA CAJA.

*Euprepia phæsoma*. B.M. 3, p. 7, Pl. 42, f. 10, A.M. Nov. 1877, p. 3.Yokohama, Yezo; very difficult to rear in captivity; described by Mr. Butler as *Euprepia phæsoma* and *auripennis*.

## 138. DIONYCHOPIUS NIVEUS, Men.

Yokohama.

## 139. AREAS LACHINA, Cram.

Yokohama.

## 140. THANATARCTIA ? sp.

Nikko.

## 141. SPILARCTIA IMPARILIS, But. B. M. 2, p. 4, Pl. 22, f. 4. A. M. Nov. 1877, p. 2. A. M. Nov. 1879, p. 351.

Yokohama, Yezo.

## 142. SPILOSOMA. ? sp.

Bought from a native.

## 143. SPILARCTIA ROSACEA, But. A.M. Nov. 1878, p. 352.

*Seriatopunctata*, Mots.

Yokohama. Mr. Butler says that a female I sent him as this species is *Seriatopunctata*, Mots. I do not think I have made any mistake. It is extremely variable and I will endeavour to breed it.

## 144. SPILARCTIA IONE, But. B.M. 3, p. 6, Pl. 42, f. 6.

Yokohama.

## 145. SPILARCTIA, ? sp.

Yokohama.

## 146. SPILARCTIA PUNCTARIUM, Cram.

Yokohama.

## 147. SPILARCTIA INEQUALIS, But. A.M. Nov. 1879, p. 351.

Ohoyama, Fujisan.



148. *SPILOSOMA LEUCOTHORAX*, Feld. A.M. Nov. 1879, p. 351.  
Yokohama.

149. *SPILOSOMA MENTHASTRI*, W. V.  
Yokohama.

# LIPARIDÆ.

150. *PORTHESIA AURIFLUA*, Hub.  
Yokohama.

151. *ARTAXA INTENSA*, But. B. M. 2, p. 10, Pl. 24, f. 12, A. M. Nov.  
1877, p. 10.  
Yokohama.

152. *ARTAXA* ? sp.  
Yokohama.

153. *ARTAXA SQUAMOSA*.  
Ohoyama, Yezo.

154. *AROA JONASII*, But. B. M. 2, p. 10, Pl. 23, f. 11. A. M. Nov. 1877,  
p. 10.  
Yokohama.

155. *AROA* ? sp.  
Yezo.

156. *LÆLIA* ? sp.  
Ohoyama, Nikko.

157. *LEUCOMA SUBVITREA*, Walk.  
Nikko.

158. *LÆLIA CENOSA*.  
Yokohama ; feeds on *Arundo* ; described by Mr. Moore as *Lælia sangaica*.

159. *DEROCA PHASMA*. But. B.M. 3, p. 49, Pl. 53, f. 4.  
Fujisan ; flies slowly by day. Mr. Butler places this among the  
*Geometra* next to *Abraxas*.

160. *LEUCOMA AURIPES*, But. B.M. 2, p. 9, Pl. 24, f. 1. A.M. Nov.  
1877, p. 10.

161. *LEUCOMA* ? sp.

Yezo ; exactly like the foregoing but not more than half the size.

162. *CIFUNA LOCUPLES*, Walk. B.M. 2, p. 18, Pl. 27, f. 6.

Yokohama.

163. *ORGYIA* ? sp.

Nikko.

164. *ORGYIA* ? sp.

Yokohama.

165. *ORGYIA* ? sp.

Ohoyama.

166. *ORGYIA* ? sp.

Ohoyama, perhaps a *Notodonta*.

167. *ORGYIA* ? sp.

Yokohama. do.

## 168. ? gn. ? sp.

Ohoyama.

169. *LIPARIS SALICIS*.

Tokiyo, Yezo.

170. *LYMANTRIA DISPAR*.

Yokohama, Yezo ; varies greatly in size, color and markings.

171. *LYMANTRIA AURORA*, But. B.M. 2, p. 11, Pl. 24, f. 5. A.M. Nov.  
1877, p. 11.

Yokohama, Kurile Islands, Yezo.

172. *LYMANTRIA MONARCHA*.

Ohoyama, Nikko, Yezo.

173. *LYMANTRIA FUMIDA*, But. B.M. 2, p. 10, Pl. 24, f. 4. A.M. Nov.  
1877, p. 10.

Yokohama.

174. *LYMANTRIA* ? sp.

Ohoyama.

## 175. ? gn. ? sp.

Yezo.

176. *CALLITEARA ARGENTATA*.

Nikko.

177. *CALLITEARA* ? sp.

Ohoyama.

178. *LYMANTRIA* ? sp.

Nikko.

179. ? gn. ? sp.

Yezo.

180. *DASYCHIRA LUNULATA*, But. B.M. 2, p. 11, Pl. 24, f. 8, A.M. Nov.

1877, p. 11,

Yokohama.

181. *DASYCHIRA*. ? sp.

Yokohama.

LASIOCAMPIDÆ.

182. *CLISIOCAMPA NEUSTRA*.

Yokohama.

183. *APHA TYCHOONA*, But. B.M. 2, p. 18, Pl. 27, f. 5.

Yokohama. The body of the larva is covered with long silky hairs, and it may be an *Arctia*.

184. *ODONISTES ALBOMACULATA*.

Yokohama.

185. *ODONISTES* ? sp.

Nikko.

186. *LASIOCAMPA ILLICIFOLIA* ?

Yezo ; this is much lighter than English specimens.

187. *LASIOCAMPA QUERCIFOLIA*.

Yokohama ; larva abundant at Fujisan.

188. *ODONESTES SUPERANS*, But. A.M. Nov. 1877, p. 20. B.M. 2, p. 19, Pl. 27, f. 4.

*Odonestes spectabilis*, But. A.M. Nov. 1877, p. 20. B.M. 2, p. 19, Pl. 27, f. 3.

(*Eona segregata*, But. A.M. Nov. 1877, p. 21. B. M. 2, p. 20, Pl. 27, f. 6, 17.

Yokohama, Kurile Islands. Feeds on pine and yew ; the larva bears a thick band of short purple-colored hairs between the segments on the fore part of the body ; these are easily detached, and cause great irritation for some weeks, on incautious handling. These hairs are deposited outside the cocoon and form a most effective defence. A very variable insect.

I have one specimen ; the right forewing is rounded and the left pointed.

Mr. Butler places varieties of this species in different genera.

189. *ÆONA EXCELLENS*, But. B.M. 2, p. 19, Pl. 26, f. 4, 5, A.M. Nov. 1877, p. 20.

Yokohama. The larva is very long lived : I have taken young early in spring ; they continue feeding up until August : the perfect insect appears late in the autumn : the male is very active, flying by day.

#### SATURNIIDÆ.

190. *ANTHERÆA YAMAMAI*.

Yokohama ; larva green like *Tropœa*. There is only one brood of this in a season. Imago appears in October, and is very variable.

191. *CALIGULA JAPONICA*, Moore. B.M. 2, p. 16, Pl. 26, f. 2. A.M. Nov. 1877, p. 18.

Yokohama. Commonly called the 'wire cartridge' moth, from the resemblance of the cocoon to the wire net in a cartridge ; last year it was found feeding on the poplars newly introduced into this country. The natives make a strong coarse silk from the cocoon, and a fine gut from the intestines of the larva. Imago appears in October ; larva hairy.

192. *CALIGULA JONASI*, But. B.M. 2, p. 16, Pl. 25, f. 2. A.M. Nov. 1877, p. 18.

Yokohama ; feeds on cherry. Larva hairy and resembles a small *Caligula japonica*.

193. *RHODIA FUGAX*, But. B.M. 2, p. 17, Pl. 26, f. 1. A.M. Nov. 1877, p. 19.

Yokohama, feeds on cherry and other trees. Both this and the preceding species appear in November and December in the perfect state. Cocoon is bright green, having a slit at the top, opening by pressure, and is suspended by a stout cord of silk, mimicking a pendant leaf. Larva smooth, bright green ; resembles a butterfly larva.

194. *BRAHMIA JAPONICA*, But. B.M. 2, p. 17, Pl. 26, f. 3.

Yokohama; feeds on the privet; larva is smooth, bright green, marked with black, and has four thin black filaments over  $1\frac{1}{2}$  inches long on the fore segments, and three on anterior. Imago appears in March and April.

195. *TROPCEA ARTEMIS* Brem.

*Aliena*, But. A.M. Nov. 1879, p. 355.

*Gnoma*, But. B.M. 2, p. 17, Pl. 25, f. 1.

*Dulcinea*, But. A.M. Nov. 1877, p. 19.

There are a succession of broods throughout the year, differing in this respect from the other Japanese Saturniidae, which are all single brooded. In a series of twelve no two specimens are alike.

Yokohama; varies considerably in shape, markings and size; feeds on the alder. Larva when disturbed gives out a clicking sound with its mandibles; it is green, with strong bristles growing from protuberances on each segment

196. *ATTACUS PRYERI*, But. B. M. 3, p. 11, Pl. 43, f. 5.

Yokohama; I am doubtful if this is distinct from *A. ailanthus*. Imago appears in July.

197. *ATTACUS*? sp.

One specimen from Hakone, given me by Mr. G. Lewis; one from Yezo.

#### NOTODONTIDÆ.

Mr. Butler places *Paleca rufescens* among the Notodontidæ. It is, I think, a *Pyralis*; the thorax of the male has a large tuft of hair, similar to the brush on the front legs of *Herminia*.

198. *DICRANURA FELINA*, But. A. M. Nov. 1877, p. 13. B. M. 2, p. 12, Pl. 25, f. 3.

Yokohama; feeds on willow. The ova, larva, pupa, and imago are like *D. vinula*. I cannot see any reason why they are separated; the food plant is also the same.

199. *DICRANURA LANIGERA*, But. B. M. 3, p. 10, Pl. 43, f. 11. A. M. Nov. 1877, p. 13.

*Cerura lanigera*.

Yokohama; feeds on willow and poplar. I believe the Japanese specimens are referable to both *furcula* and *bifida*, and that *lanigera* cannot stand as a species.

200. ? gn. ? sp.

Yokohama.

201. STAUIRUS PERSIMILIS, But. A. M. Nov. 1879, p. 353.

Yokohama; larva and imago resemble *S. fagi* closely: it is much smaller.

The larva is light reddish brown. I have noticed that the imago is attacked by a very minute yellow-bodied sand-fly, which settles on its wings, and sucks its blood, when at rest. I have not seen this fly on any other Lepidoptera, although I have paid some attention to the point during the past season. I may be wrong, but think this is a new fact in the history of parasites. I believe the fly to be a *Simulium*

202. BOMBYX. ? sp

Yokohama; a wild form of the cultivated silkworm. The larva and imago are considerably darker: it spins a much lighter cocoon than the domesticated insect; feeds on the mulberry.

203. BOMBYX MORI.

Yokohama; the silkworm of commerce. I have noticed that the Uji, a diptera, which is parasitical upon it and causes an immense amount of damage, deposits its eggs about the larva on the leaves and not on the insect.

204. LAGYRA FALCIGERA, But. B. M. 2, p. 45, Pl. 35, f. 4.

Yezo. Mr. Butler places this insect among the *Geometra* under *Urapteridæ*, but I think the position I have assigned it is the right one.

205. PERIDEA CINEREA, But. A. M. Nov. 1878, p. 353.

Yokohama; appears in April.

206. PHALERA SIGMATA, But. B. M. 2, p. 11, Pl. 24, f. 9. A. M. Nov. 1877, p. 12

207. PHALERA FLAVESCENS, Brem.

Yokohama.

208. PYGÆRA ? sp.  
Fujisan.  
Probably Mr. Butler's *Phalera fuscesens*.
209. GONOCLOSTERA LATIPENNIS, But. B.M. 2, p. 13, Pl. 27, f. 2. A.M.  
Nov. 1877, p. 15.  
Yokohama, Nikko.
210. CLOSTERA ? sp.  
Nikko, Yezo.
211. CLOSTERA ? sp.  
Nikko.
212. ? gn. ? sp.  
Yokohama.
213. ? gn. ? sp.  
Ohoyama.
214. CLOSTERA ? sp.  
Yezo.
215. CLOSTERA ANACHORETA, Fab.  
Yokohama ; feeds on poplar.
216. CLOSTERA ? sp.  
Yezo.
217. TRABALA CRISTATA, But. A. M. Nov. 1877, p. 19. B. M. 2. p. 18,  
Pl. 27, f. 1.  
Mr. Butler places this among the Lasciocampidæ.  
Yokohama ; the larva of this fine Notodonta closely resembles that  
of a Smerinthus.
218. NOTODONTA ? sp.  
Yokohama.
219. NOTODONTA ? sp.  
Nikko.
220. NOTODONTA ? sp.  
Yokohama.
221. NOTODONTA ? sp.  
Yezo.

222. NOTODONTA ? sp.

Yokohama; perhaps palpina.

223. NOTODONTA ? sp.

Nikko; very like *N. dodonœa*.

224. NOTODONTA ? sp.

Ohoyama.

225. NOTODONTA ? sp.

226. NOTODONTA ? sp.

Yokohama.

227. NOTODONTA ? sp.

Yokohama.

228. LOPHOPTERYX ? sp.

Yezo.

229. LOPHOPTERYA PRYERI, But. A.M. Nov. 1879, p. 355.

Yokohama; this is the only *Notodonta* at all common in the perfect state.

230. NOTODONTA BICOLORA.

Fujisan, Nikko; two specimens only; one taken by my collector in my presence, on the 18th June, 1876, at Fujisan, at rest in an alder, at an elevation of 5,000 ft.; the other I myself took, at light, on the 19th June, 1881, at Nikko; and the same evening and same place I took *Plusia oricalcea*, two of the great prizes of English collectors.

231. NOTODONTA ? sp.

Nikko.

232. NOTODONTA ? sp.

Fujisan; very like *N. camelina*; taken at the same time as *N. bicolora*.

233. NOTODONTA ? sp.

Nikko.

234. NOTODONTA ? sp.

Nikko.

235. NOTODONTA ? sp.

Nikko.



236. ? gn. ? sp.  
Yokohama in January.
- 

237. DATANOIDES ? sp.  
Yokohama.

238. DATANOIDES ? sp.  
Yokohama.

239. DATANOIDES FASCIATA, But. B.M. 3, p. 11, P. 43, f. 4.  
*Phalera fuscipennis*, But.

Yokohama. Mr. Butler places this in the Limacodidæ. I do not express any opinion concerning its affinities, pending discovery of the larva.

I once found a number of males clustering round a female.

#### DREPANULIDÆ.

240. ? gn. ? sp.  
Nikko.

241. PLATYPTERYX ? sp.  
Nikko.

242. DREPANA SCABIOSA, But. B.M. 2, p. 15, Pl. 25, f. 9. A.M. Nov.  
1877, p. 17.  
Yokohama.

243. PLATYPTERYX ? sp.  
Ohoyama.

244. CALLIDREPANA PALLCOLIAS, Mot.  
Fujisan, Ohoyama, Yezo.

245. Do. ? sp.  
Fujisan, Nikko.

246. ORETA PULCHRIPIES, But. B.M. 2, p. 15, Pl. 25, f. 7. A.M. Nov.  
1877, p. 15.  
Yokohama.

247. ORETA AURIPES, But. A.M. Nov. 1879, p. 355.  
Yokohama.
248. ORETA CALCEOLARIA, But. B. M. 2, p. 15, Pl. 25, f. 4. A. M. Nov.  
1877, p. 17.  
Yokohama; feeds on the wild grape.
249. DREPANA JAPONICA, Moor.  
Yokohama.
250. Do. ? sp.  
Tokiyo.
251. ORETA CALIDA, But. B. M. 2, p. 14, Pl. 25, f. 6. A. M. Nov. 1877,  
p. 15.  
Yokohama.

## PSYCHEDÆ.

252. EUMETA CRAMERI, Moore.  
Yokohama.
253. PLATEUMETA AUREA, But. E. S. 1881, p. 23.  
Yokohama.
254. EUMETA MINUSCULA, But. E. S. 1881, p. 22.  
Yokohama.
255. PSYCHE ? sp.  
Yokohama.
256. Do. ? sp.  
Yokohama.
257. Do. ? sp.  
Yokohama.

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**Geometrina.**

## URAPTERIDÆ.

258. URAPTERYX DELECTANS, But. B.M. 2, p. 45, Pl. 35, f. 2.  
Fujisan, Ohoyama, Nikko.
259. URAPTERYX CROCOPTERATA, Guen.  
Kintokisan, Nikko.

260. *URAPTERYX MACULICAUDARIA*, Mots.

Yokohama; I have one specimen, a melanic variety; the ground color of ordinary specimens is shining white, this one is a uniform dark silver grey.

261. *URAPTERYX VENERIS*, But. B. M. 3, p. 29, Pl 48, f. 1.

Yokohama, Nikko.

262. *MYRTETA ANGELICA*, But.

Yokohama.

263. *AGATHIA CARISSIMA*, But. B. M. 2, p. 50, Pl. 36, f. 7.

Mr. Butler includes this in the *Geometridæ*.

Yokohama: in my opinion, this is the most beautiful *Geometra* in the Japanese list; I believe the figure, Donovan, 'Insects of China,' 2nd Ed., 1842, plate 44, fig. 2, page 81, as *Hipparchus zonarius*, is intended for this beautiful insect.

ENNOMIDÆ.

264. *HYPERYTHRA NIPHONICA*, But. B. M. 2, p. 46, Pl. 35, f. 11.

Yokohama, Ohoyama.

265. *HYPERYTHRA STULTA*, But. A. M. Nov. 1879, p. 370.

Ohoyama.

266. *EPIONE GRATA*, But. A. M. Nov. 1879, p. 369.

Fujisan, Ohoyama, Nikko.

267. *EPIONE ADVENARIA*.

Yokohama, Ohoyama, Fujisan.

268. *ERUYMENE DOLOBRARIA*.

Nikko, Yezo.

269. *ELLOPIA FORMOSA*, But. B. M. 2, p. 47, Pl. 35, f. 9.

Yokohama.

270. *ELLOPIA* ? sp.

Yokohama.

271. *ENDROPIA ABJECTA*. A. M. Nov. 1879, p. 371.

Kobe, Fujisan, Yokohama.

272. *SELENIA EVANESCENS*, But

Nikko, Ohoyama.

273. *BIZIA SULPHUREA*, But. B. M. 2, p. 47, Pl. 35, f. 10.  
Yokohama.
274. *HUNNOPHILA* ? sp.  
Yokohama.
275. *HUNNOPHILA SUBSPERSATA*.  
Yokohama.
276. *ARACIMA MUSCOSA*, But. B. M. 2, p. 51, Pl. 36, f. 8.  
Mr. Butler includes this in the *Geometridæ*. Yokohama.
277. *PERICALLIA SYRINGARIA* ?  
Yezo.
278. *ENDROPIA* ? *MACTANS*, But. B. M. 3, p. 30, Pl. 48, p. 3.  
Ohoyama, Nikko. Very variable.
279. ? gn. ? sp.  
Ohoyama.
280. *BIZIA ÆXABIA*. B. M. 3, p. 31, Pl. 48, f. 5.  
Yokohama.
281. *ANGERONA NIGRISPARS*, But. A. M. Nov. 1879, p. 370.  
Ohoyama, Fujisan.
282. *ANGERONA PRUNARIA*.  
Nikko, Yezo; I have three forms of this very variable insect. I have not seen this at the same localities as the preceding species.
283. ? gn. ? sp.  
Ohoyama, Nikko, Yezo.
284. *SELENIA* ? sp.  
Yezo.
285. *SELENIA* ? sp.  
Nikko.
286. *SELENIA ILLUSTRARIA*.  
Nikko.
287. *NIPHONISSA ARIDA*, But. B. M. 3, p. 31, Pl. 88, f. 7.  
Yokohama. Mr. Butler places this in the *Ænochromiidae*, but it appears to me not to differ sufficiently from the 'Thorns' to exclude it from *Ennomidae*.

288. *NIPHONISSA* ? sp.

Nikko.

289. *DISCOREBA SIMPLEX*, But. B. M. 3, p. 30, Pl. 48, f. 4.

Yokohama.

290. *ENNOMOS ANGULARIA*.

Yezo.

291. *ENTRAPELA RUFESCENTARIA*, Mots ?

Yokohama.

292. *ENTRAPELA RUFESCENTARIA*, Mots.

Yokohama.

#### LIGIDÆ.

293. *PACHYLIGIA* ? sp.

Ohoyama.

294. *PACHYLIGIA MODESTA*, But. B. M. 3, p. 50, Pl. 53, f. 6.

Yokohama.

295. *PACHYLIGIA DOLOSA*, But. B. M. 3, p. 50, Pl. 53, f. 5.

Yokohama.

#### AMPHIDASIDÆ.

296. *PHIGALIA* ? sp.

Yokohama.

297. *BISTON ROBUSTUM*, But. A. M. Nov. 1879, p. 371.

Yokohama.

298. *BISTON* ? sp.

Yokohama, pectination of the antennæ of the male very fully developed.

299. *NYSSIA* ? sp.

Yokohama.

300. *EREUXA LEFUARIA*, Ersel.

*Nyssiodes algaria*, Ober.

Yokohama.

301. *AMPHIDASYS SUPERANS*, But. B. M. 2, p. 48, Pl. 35, f. 3.

Yokohama.

302. *AMPHIDASYS*? sp.  
Yokohama, Yezo, Nikko.

303. *AMPHIDASYS*? sp.  
Nikko.

BOARMIDÆ.

304. *ELPHOS LATIFERARIA*, Walk. B. M. 3, p. 36, Pl. 49, f. 11.  
Fujisan, Nikkō.

305. *EREBOMORPHA CONSORS*, But. B. M. 2, p. 52, Pl. 37, f. 3.  
Mr. Butler places this on the *Zerenidæ*. Fujisan, Nikko.

306. *ELPHOS INSUETA*, But. B. M. 2, p. 48, Pl. 36, p. 2.  
Ohoyama, Fujisan; although this insect is three inches in expanse,  
it is almost invisable when settled on the trunk of a lichen-covered tree.

307. *ANGERONA GRANDINARIA*, Mots.  
Kintokisan, Ohoyama.

308. ? gn. ? sp.  
Nikko.

309. *HEMIROPHILA ATRILINEATA*, But.  
Nikko.

310. *HEMIROPHILA SENILES*, But. B. M. 2, p. 48, Pl. 35, f. 12.  
Nikko.

311. *BOARMIA* ? sp.

312. *BOARMIA SENEX*, But. B. M. 3, p. 34, Pl. 49, f. 3.  
Yokohama.

313. *BOARMIA* ? sp.  
Fujisan.

314. *BOARMIA AGITATA*, But. B. M. 3, p. 33, Pl. 48, f. 9.  
Ohoyama Nikko.

315. *BOARMIA ARGUTA*, But. A. M. Nov. 1879, p. 372.  
Ohoyama, Yezo.

316. *BOARMIA* ? sp.  
Ohoyama.

317. *OPHTHALMODES CRETACEA*, But. A. M. Nov. 1879, p. 373.  
Yokohama.

- 318-19. *OPHTHALMODES* ? sp.  
Two species, Yokohama and Nikko.
- 320-2. ? gn. ? sp  
Three species, Nikko, Yezo.
323. *BOARMIA LEUCOPHEA*, But. B. M. 3, p. 33, Pl. 48, f. 12.  
Yokohama.
324. *BOARMIA* ? sp.  
Yezo.
325. *BOARMIA RIMOSA*, But. A. M. Nov. 1879, p. 372.  
Yokohama.
326. *BOARMIA CONFERENDA*, But. B. M. 3, p. 32, Pl. 48, f. 8.  
Yokohama.
327. *BOARMIA GRISEA*, But. B. M. 3, p. 33, Pl. 49, f. 2.  
Yokohama.
328. *BOARMIA MÆOTA*, But.  
Fujisan, one specimen taken at the summit 12,365 ft.
329. *TEPHROSIA CHARON*, But. B. M. 3, p. 35, Pl. 49, f. 4.  
Yokohama.
330. *BOARMIA* ? sp.  
Ohoyama, Nikko.
331. *BOARMIA ABIETARIA* ? sp.  
Ohoyama; I think this is quite distinct from *abietaria*.
332. *BOARMIA* ? sp.  
Nikko.
333. *TEPHROSIA PETROSA*, But. A. M. Nov. 1879, p. 372.  
Ohoyama, Nikko.
- 334-36. *BOARMIA* ? sp.  
Three species: various localities.
337. *BOARMIA DISPLICENS*, But. B. M. 3, p. 32, Pl. 48, f. 11.  
Nikko, Ohoyama.
- 338-42. *BOARMIA* ? sp.  
Five species from various localities.

843. *BOARMIA PAUPERA*, But.

Nikko.

844-48. *BOARMIA* ? sp.

Five species from various localities.

849. *BOARMIA SUBLUNARIA*, Wal.Yokohama Yezo. Variable. I believe this cannot be separated from *Tephrosia crepuscularia*.350. *TEPHROSIA IGNOBILIS*, But. B. M. 3, p. 35, Pl. 49, f. 6.

Yokohama.

351. *HYPOCHROMA PRYERI*, But. B. M. 3, p. 35, Pl. 49, f. 9.

Yokohama; feeds on the Hagi.

352. *HYPOCHROMA SUPERANS*, But. B. M. 3, p. 36, Pl. 49, f. 12.

Nikko.

353. *BOARMIA* ? sp.

Nikko.

354. *CLEORA* ? sp.

Nikko.

355. *BOARMIA ANGULIFERA*, But. B. M. 3, p. 33, Pl. 49, f. 1.

Nikko.

356-7. *BOARMIA* ? sp.

Two species, from Ohoyama and Nikko.

## GEOMETRIDÆ.

358. *TANAORHINUS CONFUSIARIA*, Walk. B. M. 3, p. 38, Pl. 50 f. 5.

Yokohama, Tokiyo, Kanosan.

359. *GEOMETRA VALIDA*, Fel.

Yokohama.

360. *GEOMETRA USITATA*, But. B. M. 2, p. 49, Pl. 36, f. 3.

Yokohama.

361. *GEOMETRA PAPILIONARIA*.

Yezo.

362. *CHLORCHROMA SPONSARIA*, Brem.

Yokohama.



363. *THALARA VENATA*, But. A. M. Dec. 1879, p. 457.  
Yokohama.
364. *THALASSODES VELLATA*, But. B. M. 2, p. 50, Pl. 36, fg. 9.  
Yokohama.
365. *THALASSODES ALBOCOSTRIA*, Brem.  
Nikko.
- 366-7. *THALASSODES* ? sp.  
Two species, Ohoyama and Nikko.
368. ? gn. ? sp  
Yezo, Nikko.
369. *THALASSODES* ? sp.  
Ohoyama.
370. *COMIBENA DIFFICTA*, But. B. M. 3, p. 37, Pl. 50, f. 3.  
Nikko.
- 371-2. *THALASSODES* ? sp.  
Two species, Nikko.
373. *THALERA* ? sp.  
Nikko.
374. *THALERA THYMIARIA*.  
Yokohama.
375. *TANAORHINUS PRASINUS*, But. A. M. Dec. 1879, p. 438.  
Yokohama.
376. *THALERA CRENULATA*, But. B. M. 3, p. 37, Pl. 50, f. 2.  
Yokohama, Yezo.
377. *RACHEOPILA NYMPHA*, But.  
Nikko.
378. *THALASSODES* ? sp  
Yokohama, Yezo.  
Varies greatly in size, smallest specimen  $\frac{1}{2}$  inch, largest  $1\frac{1}{2}$  inch.
379. *THALERA* ? sp.  
Yokohama.

380. *THALASODES MARINA*, But. B. M. 3, p. 37, Pl. 50, f. 1.

Yokohama, Yezo. I believe that this cannot be separated from *Iodis lactearia*.

#### ACIDALIDÆ.

Mr. Butler places *Michræschus aureus* among the *Acidalidæ*. This is a *Pyralis*. He has figured it twice in *Lep. Het.* B. M. Part 3, first on Plate 51, fig. 4, and again Plate 53, fig. 2, as *Marimatha straminea* among the *Pyrales*. The latter figure is evidently taken from a worn specimen.

381. *HYRIA AURORAIA*,

or *Sinicata*. But. B. M. 3, p. 41, Pl. 41, f. 3.

Yokohama.

382. *VENUSIA PHASMA*, But. A. M. Dec. 1879, p. 441.

Mr. Butler places this in the *Larentiidæ* as *Emmelesia phasma*.

This is suspiciously like *Venusia cambricaria*. Yokohama.

- 383-4. *VENUSIA* ? sp.

Two species, Nikko, Yezo.

385. *ACIDALIA* ? sp.

Yokohama.

386. *EUPISTERIA HEPARATA*.

Fujisan.

387. *ASTHENA CORCULINA*, But. B. M. 3, p. 39, Pl. 50, f. 8.

Very close, if not identical, to *A. candidata*. Yokohama.

388. *ASTHENA AURICRUDA*, But. A. M. Dec. 1879, p. 438.

Nikko, Yezo.

389. *ACIDALIA IMPEXA*, But. A. M. Dec. 1879, p. 438.

Yokohama.

- 390-397. *ACIDALIA* ? sp.

Eight species, various localities.

398. *ACIDALIA IMPERSONATA*, Wal.

Yokohama.

- 399-403. *ACIDALIA* ? sp.

Five species, various localities

404. *ACIDALIA MACESENS*, But. A. M. Dec. 1879, p. 499.

Yokohama.

405-8. *ACIDALIA* ? sp.

Four species, Yokohama.

409. *LYCANGES LACTEA*, But. A. M. Nov. 1879, p. 373.

Yokohama.

Mr. Butler describes this from a female specimen and places it in the Boarmiidae. I have the male and believe it to be an *Acidalia*.

410. *ACIDALIA JAKIMA*, But. B. M. 3, p. 40, Pl. 50, f. 10.

Yokohama.

411-12. *ACIDALIA* ? sp.

Two species, Yokohama and Nikko.

413. *ACIDALIA FREDATA*, But. A. M. Dec. 1879, p. 499.

Yokohama.

414. *ACIDALIA* ? sp.

Yokohama.

415. *ASTHENA SUPERIOR*, But. ?

Yokohama.

416-18. *ACIDALIA* ? sp.

Three species.

419. *ACIDALIA VAGATA*, Wal.

Yokohama.

420. *ACIDALIA STRIGILATA*.

Yokohama.

421. *ACIDALIA INVALIDA*, But.

Nikko.

422. *ACIDALIA* ? sp.

Yokohama.

423. *ASTHENA CONFUSA*, But. B. M. 3, p. 39, Pl. 50, f. 7.

Yokohama.

424. *ACIDALIA* ? sp.

Yokohama.

425. *ASTHENA SUPERIOR*, But. B. M. 3, p. 39, Pl. 50, f. 9.  
Yokohama.

426. *ACIDALIA* ? sp.  
Kobe.

## EPHYRIDÆ.

427. *EPHYRA SPLENDENS*, But. B. M. 2, p. 51, Pl. 37, f. 1.  
Yokohama.

428. *EPHYRA GRATA*, But. A. M. Dec. 1879, p. 438.  
Yokohama.

429. *EPHYRA* ? sp.  
Yokohama.

430. ? gn. ? sp.  
Nikko.

431. *EROSIA* ? *AZELA*, But. B. M. 3, p. 42, Pl. 51, f. 6.  
Ohoyama. Mr. Butler places this in the Micronidæ.

## CABERIDÆ.

432. *JODIS* ? *CLARISSA*, But. B. M. 2, p. 49, Pl. 36, f. 4.  
Yokohama. Mr. Butler places this in the Geometridæ.

433. *CABERA PUDECARIA*, Mots.  
Yokohama.

434. *CABERA SHEFFERI*, Brem.  
Ohoyama.

435-7. *CABERA* ? sp.  
Three species.

438. *CORYCIA* ? sp.  
Yezo.

439. *CABERA SACRA*, But. B. M. 3, p. 44, Pl. 51, f. 11.  
Yokohama.

440. *ORTHOCABERA SERICEA*, But. A. M. Dec. 1879, p. 440.  
Nikko.

441. *MICRONIA PONTIATA*, Wal.  
Yokohama.

442. *ORTHOCABERA* ? sp.

Nikko.

443. *CORYCIA* *TAMINATA*

Fujisan, Nikko.

444. *CORYCIA* *TEMERATA*

Fujisan.

445. *CORYCIA* ? sp.

Nikko.

446. *TAMANDRA* *AMATARIA*

Yokohama.

447. *TAMANDRA* *COMPTARIA*, Wal. B. M. 3, p. 41, Pl. 51, f. 2.

Yokohama.

448. *ACIDALIA* *STEGANOIDES*, But. B. M. 2, p. 51, Pl. 37, f. 8.

Yokohama.

449. *ACIDALIA* *UNISTIRPIS*, But. B. M. 2, p. 51, Pl. 37, f. 7.

Yokohama.

450. *ARGYRIS* *INDICATARIA*, Wal. B. M. 3, p. 43, Pl. 41, f. 8.

In part 2, Lep. Het. M. B., Mr. Butler places *Argyris* in the *Acidaliidæ* and in part 3 in the *Microniidæ* with *Erosia moza*; but as *Erosia* is a well marked genus without any points in common with *Argyris*, I prefer to retain the first arrangement.

Yokohama.

451. *ARGYRIS* *SUPERBA*, But. B. M. 2, p. 52, Pl. 37, f. 2.

Yokohama.

452. *ARGYRIS* ? sp.

Yezo, Nikko.

453. *ARGYRIS* ? sp.

Yezo.

454. *NAXA* *TEXTILIS*.

Yokohama. Larva hairy, gregarious. Living in a web; feeds on the privet.

455. *EUCHERA* *CAPITATA*, Wal.

Ohoyama, Fujisan.

456. gn. ? sp. ?

Ohoyama.

MACARIIDÆ.

457. *MACARIA ZACHERA*, But. B. M. 3, p. 45, Pl. 52, f. 2.

Yokohama.

458. *MACARIA NOTATA*.

Yokohama.

459. *MACARIA PRYERI*, But. A. M. Dec. 1879, p. 480.

Ohoyama.

460. *MACARIA NIGRONOTARIA*, Brem.

Yokohama.

461. *MACARIA IRRORATA*, But. A. M. Dec. 1879, p. 480

Yokohama.

462. *MACARIA SINICARIA*, Wal.

*Hebesata*, Walk. B. M. 3. p. 44, Pl. 52, f 1.

*Maligna*, But. B. M. 3, p. 45, Pl. 52, f. 3.

Yokohama. *Hebesata* I believe to be the male, *maligna* the female.

463. *BITHIA AMASA*, But. B. M. 3, p. 45, Pl. 52, f. 4

Ohoyama.

464-7. *MACARIA* ? sp.

Four species.

468. *ENDROPIA GRACILIS*, But. A. M. Nov. 1879, p. 371.

Mr. Butler places this in the Ennomidæ. Nikko.

469. *ENDROPIA* ? sp.

Ohoyama.

470. *HETEROLOCHA DEBILIS*, But. B. M. 2, p. 41, Pl. 35, f. 8.

Mr. Butler includes this in Ennomidæ.

Yokohama.

471. ? gn. ? sp.

Ohoyama.

FIDONIIDÆ.

472. *FIDONIA*. ? sp.

Ohoyama.

473. *EPIONE*, ? *ARENOSA*, But. B. M. 2, p. 46, Pl. 35, f. 1.  
Mr. Butler places this, *leda* and *strenitoides* among the *Ennomidæ*.
474. *EPIONE LEDA*, But. B. M. 2, p. 4, Pl. 35, f. 5.  
Ohoyama, Nikko. I have not yet seen a female of this.
475. *NUMERIA PULVERARIA*.  
Ohoyama, Nikko.
476. *NEMATOCAMPA STRAMINEA*, But. A. M. Nov. 1879, p. 370.  
Yokohama. Mr. Butler places this in the *Ennomidæ*.
477. *STRENIA*. ? sp.  
Yezo.
478. *LOZOGRAMMA VAPULATA*, But. A. M. Dec. 1879, p. 441.  
Yokohama.
479. *LOZOGRAMMA AMELIA*, But. B. M. 3, p. 46, Pl. 52, f. 6.  
I do not think this insect is either a *Fidonia* or *Lozogamma*; I think it is more closely allied to *Oporabia*. Yokohama.
480. *SELIDOSEMA SORDIDA*, But. B. M. 3, p. 46, Pl. 52, f. 7.  
Ohoyama Nikko.
481. *SELIDOSEMA* ? sp.  
Ohoyama.
482. *EPIONE* ? *STRENIoides*, But. B. M. 2, p. 46, Pl. 35, f. 6.  
Ohoyama, Nikko.  
I have not yet seen a male of this.
483. *OZOLA TERRANEA*, But. A. M. Dec. 1879, p. 441.  
Yokohama.
484. *ARGIDAVA MACULATA*, But. A. M. Nov. 1879, p. 373.  
Ohoyama, Nikko. Mr. Butler places this in the *Boarmiidæ*. It mimics *Æmene fasciata* and is found in the same localities at rest on stones.
485. *PANAGRA PETRARIA*.  
Nikko, Yezo.
486. ? gn. ? sp.  
Fujisan, Nikko.

## 487. CABERODIS NIPONARIA, Fel.

Yokohama.

## 488. CABERODIS. ? sp.

Yokohama ; a very large form of the foregoing species.

## 489. ASPILATES MUNDATARIA.

Fujisan.

## 490-2. ? gn ? sp.

Three species.

## ZERENIDÆ.

## 493. LOMASPILIS MARGINATA.

*Opis*, But. B. M. 3, p. 49, Pl. 53, f. 3.

Nikko, Yezo.

## 494. ? gn. ? sp.

Yezo.

## 495. PERENIA GIRAFFATA, Wal.

Fujisan.

## 406. PERENIA ? sp.

Fujisan, Yezo.

## 497. VITHORA AGRIONIDES, But. M. B. p. 3, Pl. 22, f. 3, part 2.

Yokohama. Mr. Butler places this the genus *Agaristidæ*; it is, however, a *Geometra* allied to *Abraxas*. Very abundant; larva often found in dwarf *Pyrus Japonica*.

## 498. ABRAXAS EURYMEDE, Mots.

Yokohama.

## 499. ICTERODES JAGUARIA.

Ohoyama.

## 500. ICTERODES FRATERNA, But. B. M. 2, p. 53, Pl. 37, f. 9.

Nikko.

## 501. ABRAXAS JUNCTILINEATA, Wal. B. M. 2, p. 53, Pl. 37, f. 5.

Yokohama.

## 502. ABRAXAS LANGUIDATA.

Ohoyama.



503. *ABRAXAS WHITELEYI*, But. B. M. 2, p. 52, Pl. 37, f. 4.  
Yezo, Nikko ; two forms.
504. *ABRAXAS* ? sp.  
Yezo, Nikko ; three forms.
505. *ABRAXAS GROSSULARIATA*.  
*Conspuricata*, But. B. M. 3, p. 48, Pl. 52, f. 11.  
Fujisan, Nikko. Generally smaller and darker than English specimens. It is rare.
506. *ABRAXAS MIRANDA*, But. B. M. 3, p. 48, Pl. 52, f. 12.  
Yokohama.
507. *ABRAXAS ELEGANS*, But. B. M. 2, f. 53, Pl. 37, f. 6.  
Nikko, Ohoyama.

HYBERNIDÆ.

508. *INUROIS TENUIS*, But. A. M., Dec., 1879, p. 445.  
Yokohama. Mr. Butler places this in the *Larentiidae*.
509. *INUROIS* ? sp.  
Yokohama.
510. *HYBERNIA LEUCOPHEARIA*,  
" *obliquaria*, Wal.  
" *dira*, But. B. M. 3, p. 50, Pl. 53, f. 7.  
Yokohama. Very variable.
511. *ANISOPTERYX* ? sp.  
Yokohama.
512. *HYBERNIA BELA*, But. B. M. 3, p. 46, Pl. 52, f. 5.  
*Lozogramma bela*, But.  
Yokohama. Mr. Butler places this in the *Fidoniidae* ; the female is semi-apterous like *H. progemmaria*.

LARENTIIDÆ.

- 513-14. *OPORABIA* ? sp.  
Two species, Yokohama.
- 515-16 *LYGRANOA* ? sp.  
Two species.

517. *LYGRANOA FUSCA*, But. B. M. 3, 54, Pl. 54, f. 7.  
Ohoyama, Nikko.
518. ? gn. ? sp.  
Yokohama.
- 519-20. *EMMELESIA* ? sp.  
Two species.
521. *COREMIA FULVIDA* ? But.  
Nikko.
- 522-3. *EMMELESIA* ? sp.  
Nikko.
- 524-5. *EUPETHESIA* ? sp.  
Two species.
526. *EUPETHESIA RUFESCENS*, But. B. M. 3, p. 52, Pl. 53, f. 12.  
Yokohama.
527. *LOBOPHORA MISERA*, But. A. M. Dec. 1879, p. 443.  
Yokohama.
528. *EUPETHESIA* ? sp.  
Ohoyama.
529. *EUPETHESIA EXCISA*, But. B. M. 3, p. 52, Pl. 53, f. 11.  
Yokohama.
530. *LOBOPHORA* ? *JULIA*. But. B. M. 3, p. 53 Pl. 54, f. 4.  
Yokohama.
531. *EUPETHESIA CONSUETA*, But. A. M. Dec. 179, p. 442.  
Yokohama.
- 532-39. *EUPETHESIA* ? sp.  
Eight species.
541. *EUPETHESIA PROTERVA*, But. B. M. 3, p. 52, Pl. 54, f. 1.  
Yokohama.
541. *EUPETHESIA SIGNIGERA*, But. A. M. Dec. 1879, p. 482.  
Yokohama.
- 542-3. *EUPETHESIA* ? sp.  
Two species.

544. *EUPETHESIA CALIGINEA*, But. B. M. 3, p. 52, Pl. 54, f. 2.  
Yokohama.
545. *DESCOREBA SIMPLEX*, But.  
Yokohama.
546. *EUPETHESIA* ? sp.  
Yokohama.
547. *EUPETHESIA LUCINDA*, But. A. M. Dec. 1887, p. 442.  
Yokohama.
548. *EUPETHESIA* ? sp.  
Yokohama.

MICRONIIDÆ.

549. *EROSIA PLAGIFERA*.  
The *Erosia*, when at rest, sit in a peculiar manner. The hind wings are widely separated from the fore wings and are elevated in the middle.
550. *EROSIA STYX*, But.
551. *EROSIA STYX* ?  
Fujisan.
552. *EROSIA MOZA*, var. But. B. M. 3, p. 42, Pl. 51, f. 7.  
Yokohama.
553. *EROSIA* ? sp.  
Nikko. Only differs from the former in size; it is rather more than twice as large.
- 554-6. *EROSIA* ? sp.  
Three species. Nikko.

LARENTIIDÆ.

557. *LOBOPHORA TERRANEA*, But. B. M. 3, p. 53, Pl. 54, f. 6.  
Yokohama.
558. *EMMELESIA* ? sp.  
Fujisan.
559. *LOBOPHORA HEMANA*, But. B. M. 3, Pl. 53, f. 8.  
*Larentia* "  
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## 560-3. LOBOPHORA ? sp.

Four species.

## 564. LOBOPHORA MUSCIGERA, But.

Fujisan.

## 565. LOBOPHORA VOLITANS, But. B. M. 3, p. 53, Pl. 54, f. 5.

Yokohama.

## 566. LOBOPHORA HEMANA ? But.

Yokohama. I have reserved the name *hemana* for this, but it is quite distinct from No. 559.

## 567. LOBOPHORA ? sp.

Nikko.

## 568. EMMELESIA ? sp.

Yokohama.

## 569. LOBOPHORA ? sp.

Yokohama.

## 570. THERA COMIS, But. A. M. Dec. 1879, p. 443.

Ohoyama.

## 571-3. THERA ? sp.

Three species.

## 574. YPSIPETES ? sp.

Fujisan, Nikko.

## 575. MELANIPPE HECATE, But. B. M. 3, p. 55, Pl. 54, f. 12.

Fujisan, Nikko.

## 576. MELANTHIA ALBICILLATA.

*Casta*, But. B. M. 3, p. 54, Pl. 54, f. 8.

Yezo.

## 577. MELANTHIA RUBIGINATA.

Yezo.

## 578. MELANIPPE ABRAXINA, But. A. M. Dec. 1879, p. 443.

Nikko.

## 579. MELANIPPE YOKOHAMÆ, But.

Fujisan.

580. *COREMIA FRIGIDA*, But. B. M. 3, p. 56, Pl. 55, f. 3.  
Yokohama.
581. *MELANIPPE INQUINATA*, But. B. M. 3, p. 5, Pl. 54, f. 9.  
Yokohama.
582. *MELANIPPE SUPERGRESSA*, But. B. M. 3, p. 55, Pl. 54, f. 11.  
Yokohama.
583. *MELANIPPE BELLA*, But. B. M. 3, p. 55, Pl. 54, f. 10.  
Yokohama.
584. *ANTICLEA UMBEIFERA*, But. A. M. Dec. 1879, p. 444.  
Yokohama.
585. *ANTICLEA* ? sp.  
Fujisan.
586. *COREMIA* ? sp.  
Nikko.
587. *CIDARIA* ? sp.  
Yezo.
- Mr. Butler places *complicata* among the *Cidaria*. I believe this to be a *Pyralis*. When at rest it sits with its head downwards, pressed against the trunk of a tree, and its wings partially elevated.
- 588-9. *COREMIA* ? sp.  
Two species.
590. *COREMIA DIMIDARIA*, Mots.  
Yokohama.
- 591-2. *COREMIA* ? sp.  
Two species.
593. *COREMIA INAMCENA*, But. A. M. Dec. 1879, p. 444.  
Yokohama.
- 594-5. *COREMIA* ? sp.  
Two species.
596. *CAMPTOGRAMMA FLUVIATA*.  
Yokohama.
597. *ANISODES HADASSA*, But. B. M. 3, p. 30, Pl. 50, f. 5.  
Yokohama.

Mr. Butler places this in the Ephyridæ.

598. ANISODES HADASSA ?

Yokohama.

599. CABERA ELIELA, But. B. M. 3, p. 43, Pl. 51, f. 9.

Yezo, Nikko.

Mr. Butler places this in the Caberidæ.

600. ANTICLEA CONSANGUINEA, But. B. M. 3, p. 56, Pl. 55, f. 1.

Yokohama.

- 601-2. ANTICLEA ? sp.

Two species.

603. SCOTOSIA ? sp.

Yezo.

- 604-6. PHIBALAPTERYX ? sp.

Three species.

607. PHIBALAPTERYX EXCULTA, But.

*Tephrosia* " "

Yokohama.

608. SCOTOSIA IGNOBILIS, But.

Yezo, Nikko.

- 609-10. SCOTOSIA ? sp.

Two species.

611. SCOTOSIA CERTATA.

Yezo, Nikko.

612. SCOTOSIA SERICATA, But. A. M. Dec. 1879, p. 444.

Yokohama.

613. SCOTOSIA LUCICOLENS, But. B. M. 2, p. 54, Pl. 37, f. 10.

Yokohama.

614. SCOTOSIA ? sp.

Yezo.

615. CIDARIA OBLONGATA, Wal.

Yokohama.

616. *CIDARIA CORYLATA*.  
Ohoyama, Nikko, Yezo.
617. *CIDARIA MINNA*, But.  
Nikko.
618. *CIDARIA ÆROSA*, But. B. M. 3, p. 58, P. 55, f. 7.  
Yezo, Nikko.
619. *CIDARIA* ? sp.  
Nikko.
620. *CIDARIA UMBROSARIA*, Mots.  
or *Silaceata*.  
Yokohama.
621. *CIDARIA RUSSATA*.  
Yokohama.
622. *CIDARIA IMMANATA*.  
Yokohama.
623. *CIDARIA MACTATA*, Fel.  
Ohoyama, Nikko.
624. *CIDARIA LEDERERI*, Brem.  
Yokohama.
625. *GANDARITIS FIXENI*, Brem.  
Ohoyama, Nikko, Yezo.
626. *EUCHERA AGNES*, But. B. M. 3, p. 47, Pl. 52, f. 10.  
Ohoyama, Nikko, Yezo.  
Mr. Butler places this in the *Zerenidæ*.
627. *EUCHERA* ? sp.  
Ohoyama, Nikko, Yezo.
628. *CIDARIA CONVERGENATA*, Brem.  
Fujisan, Yezo, Nikko.

EUBOLIIDÆ.

629. *CHÆRODIS DICTYNNA*, But. B. M. 2, p. 45, Pl. 35, f. 7.  
Yokohama.  
Mr. Butler places this in the *Urapteridæ*.

630. *CIDARIA MENDICA*, But. A. M. Dec. 1879, p. 446.  
Nikko, Ohoyama.
631. *EUBOLIA NIPHONICA*, But. B. M. 3, p. 59, Pl. 55, f. 11.  
Nikko.

## LARENTIIDÆ.

632. *CIDARIA TETRICA*, But. B. M. 3, p. 59, Pl. 55, f. 10.  
Ohoyama.
633. *CIDARIA* ? sp.  
Nikko.
634. ? gn. ? sp.  
Yokohama.
635. *ANAITIS PLAGIATA*.  
Nikko, Ohoyama.
636. *THIOPSYCHE PRYERI*, But. B. M. 3, p. 29, Pl. 48, f. 2.  
Ohoyama Nikko. Mr. Butler places this in *Ennominidæ* *Sionidæ*.
637. *PSYCHOSTROPHIA MELANARGIA*, But. A. M. Nov. 1877, p. 9. B. M.  
2, p. 9, Pl. 23, f. 7.  
Nikko, Fujisan.  
Mr. Butler places this among the *Bombyx* with *Psychogoes aterrima*.  
It is an active day flyer.
638. *BAPTRIA EXSECUTA*, Fel.  
Ohoyama, Nikko, Yezo.  
Active by day. Varies considerably, in a similar manner to  
*Psychogoes aterrima*. I have a series of 31 specimens of this and the  
next two, but find it a difficult matter to determine where one leaves off  
and the other begins. *B. execata* generally has a spotted fringe, but  
individual specimens vary in this respect.
639. *PSYCHOGUES* ? sp.  
Nikko. Probably only a variety of the next.
640. *PSYCHOGUES ATERRIMA*, But. B. M. 2, p. 8, Pl. 23, f. 8. A. M.  
Nov. 1877, p. 8.  
Mr. Butler places this among the *Bombyx*, as a *Nyrtemeridæ*. I  
believe it to be closely allied to *Tanagra charophyllata*; it is a day flyer;



very variable; in some specimens the white occupies a third of the fore wing, others are nearly all black, and others, again, have a large white patch in the hind wing.

641. ? gn. ? sp.

Yokohama.

642-3. ? gn. ? sp.

Two species.

## Noctuites.

### CYMATOPHORIDÆ.

644. *THYATIRA Batis*, Treit.

Yezo, Fujisan.

645. *GONOPHORA AURORINA*, But.

Nikko, Fujisan.

646. *THYATIRA* ? sp.

Nikko.

647. *GONOPHORA DERASA DEROSOIDES*, But. B. M. 3, p. 12, Pl. 44, f. 1.

Fujisan.

648. *THYATIRA PRYERI*, But.

Yokohama.

I think this approaches nearer to *Cymatophora* than *Thyatira*.

649. *CYMATOPHORA MIRABILIS*, But. A. M. Nov. 1879, p. 365.

*Xylina*.

Yokohama.

650. *CYMATOPHORA ARCTIPENNIS*, But. B. M. 3, p. 17, Pl. 45, f. 3.

*Xylina*.

Yokohama.

Mr. Butler includes this and the foregoing with *Xylinidæ*, with which neither have any points in common, and both are true *Cymatophora*.

651. *CYMATOPHORA ARCTIPENNIS*, But. ?

Yokohama.

652. *CYMATOPHORA* ? sp.

Fujisan.

653. CYMATOPHORA PLUMBEA, But. A. M. Nov. 1879, p. 357.

Yokohama.

654. CYMATOPHORA OCTOGESIMA, But. B. M. 2, p. 21, Pl. 28, f. 2.

Yokohama.

- 655-6. CYMATOPHORA ? sp.

Two species.

#### GLETTULIDÆ.

657. DANDACA SENEX, But. B. M. 3, p. 13, Pl. 44, f. 6.

Yokohama.

This insect spins a boat-shaped cocoon like a *Chloephora*. It varies greatly, and sometimes is *quite* invisible when settled on the bark of trees. As an instance of this, I lately found five specimens on the trunk of a maple; three of them could be detected several yards away, but two so exactly resembled the bark of the tree on which they were settled, that it was not until I disturbed these, when taking off the first three, that I detected them, although all five were included in a space of five inches.

- 658-64. ? gn ? sp.

Seven species.

665. BRYOPHILA ? sp.

Nikko.

#### BOMBYCOIDÆ.

666. ACRONYCTA LEUCOCUSPIS, But. B. M. 3, p. 12, Pl. 44, f. 2.

Yokohama.

667. ACRONYCTA INCRETA, But. B. M. 3, p. 12, Pl. 44, f. 3.

Yokohama. The larva is very like *A. tridens*, which also probably occurs here.

668. ACRONYCTA PSI.

Yokohama. I have frequently taken the larva off alder.

669. ACRONYCTA HERCULEA, But.

Eurois

Yokohama.

670. *ACRONYCTA* ? sp.

Kuriles, Fujisan

This is a fine large insect, measuring  $2\frac{1}{2}$  inches. The specimen from the Kuriles was given me by Mr. H. J. Snow, who took it there. It is most probably distinct, and, pending further information, I propose the name *Acronycta snowi* for it. Size,  $2\frac{1}{8}$  inches; color, light grey, with a forked black streak in the centre of the wing, extending horizontally from the base for  $\frac{1}{4}$  inch. All other markings are observed; hind wing, light silver grey, with an indistinct central spot, and an ill-defined streak round the wing towards the hind margin.

670. *ACRONYCTA CONSANGUIS*, But.

Yokohama.

671. *ACRONYCTA CONSANGUIS*, But ?

Yokohama.

672. *ACRONYCTA ALNI*.

Yezo.

673-4. *ACRONYCTA* ? sp.

Two species. Yezo.

675. *ACRONYCTA SUBVIRIDIS*, But. B. M. 2, p. 32, Pl. 31, f. 3.

*Plataplecta*.

Yokohama.

Mr. Butler places this among the *Hadenidæ*.

676. *ACRONYCTA RUMICIS*.

Yokohama.

677. *THOLPOPHILA DIGNA*, But.

Yokohama.

Mr. Butler places this among the *Apameidæ*.

678. *ACRONYCTA PHARETRA LEUCOPTERA*, But.

Yokohama.

Mr. Butler places this among the *Bombyx*, as one of the *Arctiidæ*.

679. *BELOSTICTA EXTENSA*, But. A. M. Nov. 1879, p. 357.

This varies considerably. Some specimens are almost black, and somewhat resemble *Petasia nebulosa*. It is commonly found at rest on the trunks of fir trees.

680. ACRONYCTA ? sp.  
Yokohama.
681. ACRONYCTA BRUMOSA, var Gun.  
*Pharætra*.  
Yokohama.
682. GERBATHA ANGUSTA, But.  
Yokohama.
683. ? gn. ? sp.  
Yokohama.
684. DIPHTERA ORION, Sepp.  
Nikko, Fujisan.

## LEUCANIIDÆ.

685. LEUCANIA ? sp.  
Fujisan.  
Mr. Butler places *Micardia argentata* and *pulchra* among the  
Leucaniidæ. They are both *Pyralis*.
686. MYTHIMNA DIVERGENS. B. M. 2, p. 22, Pl. 28, f. 8.  
Fujisan, Nikko.
687. LEUCANIA TURCA.  
Yokohama.
688. MYTHIMNA PLACIDA, But. B. M. 2, p. 21, Pl. 28, f. 5.  
Yokohama.
689. MYTHIMNA PLACIDA, But. ?  
*Singularis*.  
Yokohama.
- 690-91. LEUCANIA ? sp  
Two species. Yokohama.
692. MYTHIMNA PLACIDA ?  
*Singularis*.  
Yokohama.
693. LEUCANIA ?  
Yokohama.

694. *LEUCANIA NAUSEANS*, But. A. M. Nov. 1879, p. 359.

*Extranea*, Guen.

Yokohama.

695. *LEUCANIA FASTIDIENS*. A. M. Nov. 1879, p. 359.

*Laucania loreyi*, Dup.

Yokohama.

696-7. *LEUCANIA* ? sp.

Two species. Yokohama.

698. *NONAGRIA INNOCENS*, But.

Yokohama.

699. *LEUCANIA* ? sp.

Yokohama.

700. *NONAGRIA* ? sp.

Yokohama.

701. *NONAGRIA TURPIS*, But. A. M. Nov. 1879, p. 359.

Yokohama.

702-3. *NONAGRIA* ? sp.

Two species.

704-6. ? gn ? sp.

Three species.

#### APAMIIDÆ.

707. *GORTYNA* ? sp.

Yokohama.

708. *OCHRIA FORTIS*, But. B. M. 2, p. 23, Pl. 28, f. 9.

Fujisan. Very like *Gortyna flavago*.

709. *AGROTIS ILLOBA*, But. B. M. 3, p. 14, f. 7.

Yokohama.

Mr. Butler includes this in *Agrotis*. I believe it to be an *Apamia*.

710. *AXYLIA PUTRIS*.

Yokohama.

711-3 ? gn ? sp.

Three species.

714. DIPTERYGIA ? sp.  
Yokohama.
715. DIPTERYGIA TRISTIS, But. A. M. Nov. 1879, p. 359.  
*Caliginosa*, Wal.  
Yamato.
716. CHARGEAS DEPRAVATA, But. A. M. Nov. 1879, p. 360.  
*Agrotis depravata*, But.  
Yokohama.  
I do not think this is an *Agrotis*.
717. MANESTRA BRASSICÆ.  
Yokohama.
718. MANESTRA ? sp.  
Yokohama.
- XYLOPHASIIDÆ.
719. XYLOPHASIA SODALIS, But. B. M. 2, p. 24, Pl. 29, f. 2.  
Yokohama.
- 720-2. XYLOPHASIA ? sp.  
Three species. Yokohama.
723. NÆNIA MUSCOSA, But.  
Yokohama.
- 724-6. XYLOPHASIA ? sp.  
Three species. Yokohama.
727. APAMEA CONCILIATA, But. B. M. 2, p. 24, Pl. 29, f. 3.  
Yokohama.
728. APAMEA CONCILIATA, But. ?  
Yokohama.
- 729-37. APAMEA ? sp.  
Nine species.
738. MIANA SEGREGATA, But. B. M. 2, p. 25, Pl. 29, f. 5.  
Yokohama.
739. MIANA VULNERATA, But. B. M. 2, p. 25, Pl. 29, f. 4.  
Yokohama.

740. *MAMESTRA BIGUTATA*, Mots.

Yokohama.

741-42 ? gn ? sp.

Two species. Fujisan.

743. *AMYNA STEATA*, But.

Yokohama.

744-6. *MIANA* ? sp.

Three species. Yokohama.

GLOTULIDÆ.

747. *GLOTULA SORDIDA*, But.

Yezo, Yokohama.

748. *RADINACRA LINEOSA*, Mone.

Yokohama.

749. *ORTHOSIA CINARESCENS*, But.

Yokohama.

NOCTUIDÆ.

750. *AGROTIS* ? sp.

Fujisan.

751. *AGROTIS INGRATA*, But. B. M. 2, p. 27, Pl. 29, f. 9.

Yokohama.

752. *AGROTIS SUFFUSA*.

Yokohama.

753. *AGROTIS SEGETUM*.

Yokohama.

754. *AGROTIS PRÆCOX*.

Yokohama.

755-9. *AGROTIS* ? sp.

Five species.

760. *AGROTIS CECILIA*, But. B. M. 3, p. 14, Pl. 44, f. 9.

*Hermonassa* " "

Yokohama.

761-2. ? gn ? sp.

Two species. Fujisan.

763. *TRIPHÆNOPSIS EFFLORESCENS*, But. A. M. Nov. 1879, p. 361.  
Fujisan.

764. *TRYPÆNA* ? sp.  
Yezo.

765. *EPILECTA DECORATA*, But. A. M. Nov. 1879, p. 361.  
Yezo.

766. *NOCTUA* ? sp.  
Yokohama.

767. *GRAPHIPHORA LUBENTIA*, But. A. M. Nov. 1879, p. 362.  
Yokohama.

768. *GRAPHIPHORA EXUSTA*, But. B. M. 2, p. 28, Pl. 29, f. 11.  
Yokohama.

769. *GRAPHIPHORA CANESCENS*. B. M. 2, p. 28, Pl. 30, f. 1.  
Yokohama.

770-71. *NOCTUA* ? sp.  
Two species. Yokohama.

772. *OCHROPLEURA PLUMBATA*, But.  
Yoshino.

773. *NOCTUA* ? sp.  
Yokohama.

774. *NOCTUA DEPARCA*, But. A. M. Nov. 1879. p. 358.  
*Mythimna* "  
Yokohama.  
Mr. Butler places this in the *Leucaniidæ*.

775. *NOCTUA DESCRIPTA*, But.  
Yokohama.

776. *NOCTUA STUPENDA*, But. B. M. 2, p. 29, Pl. 30, f. 3.  
*Ochropleura* "  
Yoshino.

777. *NOCTUA DILATATA*, But. A. M. Nov. 1879, p. 364.  
*Mesogona* "  
Yokohama.

I cannot understand Mr. Butler's genus *Mesogona*. He includes



three widely different species in it—*dilatata*, *divergens* and *contracta*. The first I believe to be in the Noctuidæ, the second in Orthiniidæ and the third in Xylinidæ.

778. GRAPHIPHORA LEPIDA, But. A. M. Nov. 1879, p. 362.

779. NOCTUA ? sp.

Fujisan.

780. NOCTUA PLECTA.

Yokohama.

781-2. NOCTUA ? sp.

Two species. Yokohama.

#### ORTHOSIIDÆ.

783. PANOLIS PINIPERDA. A. M. Nov. 1879, p. 362.

Yokohama.

784. TÆNIOCAMPA GOTHICA.

*Semiophora palascens*, But. B. M. 2, p. 29, Pl. 30, f. 4.

Yokohama.

785. TÆNIOCAMPA EVANIDA, But. A. M. Nov. 1873, p. 362.

Yokohama.

786. TÆNIOCAMPA ODIOSA, But.

Yokohama.

787. TÆNIOCAMPA GRACILIS.

Yokohama.

788. TÆNIOCAMPA ? sp.

Yezo.

789. TÆNIOCAMPA MUNDA.

Yokohama.

790. TÆNIOCAMPA CARNIPENNIS, But. B. M. 2, p. 30, Pl. 30, f. 6.

Yokohama.

791. TÆNIOCAMPA ELLA, But. B. M. 2, p. 30, Pl. 30, f. 7.

Yokohama.

823. ? gn ? sp.

Yezo.

824. DIANTHESIA ? sp.

Nikko.

825. APLECTA ? sp.

Yezo.

826. MISELIA OXYACANTHÆ CINEREA, But.

Nikko.

827. ? gn. ? sp.

Nikko.

828-30. APLECTA ? sp.

Three species.

831. GEYERI.

Yokohama.

832 ? gn. ? sp.

Nikko.

833. EUPLEXIA LUCIPARA.

Nikko.

834. ? gn. ? sp.

Nikko.

#### HYPOGRAMMIDÆ.

835. GERBATHA YPSILON, But. B. M. 3, p. 24, Pl. 47, f. 1.

Yokohama.

#### HADENIDÆ.

836. APLECTOIDES NITIDA, But. B. M. 3, p. 16, Pl. 45, f. 1.

Yokohama.

837-42. HADENA ? sp.

Six species

843. XYLOMYGES BELLA, But.

Yokohama.

Mr. Butler places this among the Xylophasiidæ.

844. *HADENA* ? sp.

Yokohama.

845. *HADENA CONSANGUIS*, Guen.

Yokohama.

846. *HADENA* ? ? sp.

Yokohama.

I am puzzled where to place this, as it resembles, perhaps superficially, both *Xylophasia* and *Apamea*.

847. *HADENA ATRIPLICIS*, But.

“ *gnoma*.

Generally rather larger than English specimens. It varies in markings slightly.

848. *HADENA LIMBATA*, But. A. M. Nov. 1879, p. 360.

*Apamea* “ “

Yokohama.

I believe this to be *Hadena* and not *Apamea*. Mr. Butler places it in the *Apameidæ*.

#### XYLINIDÆ.

849. *PENICILLARIA COSTALIS*, But. A. M. Nov. 1879, p. 367.

Yokohama.

Mr. Butler places this in *Eurhipidæ*, next to *Thyris usitata*, which is either allied to *A. geridæ* or *E. nuychidæ*. The two insects are widely different, and do not show the slightest generic affinity.

850. *XYLOPHASIA SCITULA*, But. A. M. Nov. 1879, p. 359.

Yokohama.

Mr. Butler places this among the *Xylophasia*.

851. *CALOCAMPA FORMOSA*, But. B. M. 2, p. 33, Pl. 31, f. 9.

Yokohama.

852. *CALOCAMPA EXOLETA*. B. M. 2, p. 33, Pl. 31, f. 8.

“ *fumosa*.

Yokohama.

853. *CERASTIS* ? *CEROTINA*.

Yokohama.

854. *MESOGONA* ? *CONTRACTA*, But. B. M. 2, p. 31, Pl. 31, f. 1.

Yokohama.

This species has no points of resemblance with Mr. Butler's *Mesogona divergens*, but as I am necessarily unacquainted with the type of *Mesogona*, I cannot say what genus either species should be attached to.

855. *XYLINA PRUINOSA*, But. B. M. 2, p. 34, Pl. 31, f. 6.

Yokohama.

856. *XYLINA USTULATA*, But.

*Agrotis* " "

Yokohama.

857. *LITHOPHANE SAGA*, But. B. M. 3, p. 18, Pl. 45, f. 9.

Yokohama.

858. *CUCULLIA FRATERNA*, But. B. M. 3, p. 18, Pl. 45, f. 10.

Yokohama.

- 859-60. ? gn. ? sp.

Two species.

#### ERIOPIIDÆ.

861. *CALLOPISTRIA ÆTHIOPS*, But. B. M. 3, p. 21, Pl. 46, f. 4.

Nikko.

862. *CALLOPISTRIA OBSCURA*, But. B. M. 3, p. 21, Pl. 46, f. 3.

Yokohama.

#### HELIOTHIDÆ.

863. *HELIOTHIS MARGINATA*.

Fujisan.

864. *HELIOTHIS ARMIGERA*.

Yokohama.

865. *HELIOTHIS ARMIGERA* ?

Fujisan.

866. *HELIOTHIS DIPSACIA*.

Do. *Adalucta*, But. B. M. 3, p. 19, Pl. 45, f. 4.

Yokohama, Yezo.

237 Generally rather larger than English specimens.

ACONTIDÆ.

867. AGROPHILA SULPHURALIS.

Yokohama, Yezo.

868. ? gn. ? sp.

Yokohama.

869. ERASTRIA VENUSTULA.

*Acontia noloides*, But. A. M. Nov., 1879, p. 366.

Yokohama, Yezo.

To the best of my recollection, this does not differ from *Erastria venustula* sufficiently to call for a separate description. I find my Japanese specimens differ slightly. Some are darker and more distinctly marked than others.

870. ACONTIA SIGNIFERA.

Yokohama.

871. ACONTIA AREFACTA, But. A. M. Nov. 1879, p. 366.

Yokohama.

872. NAROSA CULTA, But. A. M. Nov. 1879, p. 356.

Yokohama.

Mr. Butler places this among the *Limacodidæ*.

873. ACONTIA VIALIS, Moore.

Yokohama, Yezo.

874. ACONTIA ? sp.

Yezo.

875. ERASTRIA ATRATA, But.?

Yokohama.

I believe a mistake has been made in my number, as this insect does not at all agree with the description.

ANTHOPHILIDÆ.

876. ANTHOPHILA PARADISEA, But. B. M. 2, p. 34, Pl. 31, f. 4.

Tokio, Nikko.

877. ANTHOPHILA ? sp.

Nikko.

878. *ANTHOPHILA HEBESCENS*, But. A. M. Nov. 1879, p. 366.  
Yokohama.
879. *ANTHOPHILA* ? sp.  
Yokohama.
880. *NARANGA QUADRIVITTATA*, Moore.  
Yokohama.
881. *HYDRELIA* ? sp.  
Yokohama.

## POAPHILIDÆ.

882. *PHYLLOPHILA CRETACEA*, But. B. M. 3, p. 28, Pl. 47, f. 11.  
Yokohama.
883. ? gn. ? sp.  
Yezo, Yokohama.
884. *MUROPHYSA PUNCTIGERA*, Walk.  
Yokohama.

## ERASTRIIDÆ.

- 885-7. *ERASTRIA* ? sp.  
Three species.
888. *ERASTRIA FUSCULA*.  
Ohoyama.
889. *ERASTRIA* ? sp.  
Nikko.
890. *ERASTRIA STYGIA*, But. B. M. 3, p. 20, Pl. 46, f. 2.  
Yokohama.
891. *ERASTRIA STYGIA*, But. ?  
Yokohama.
- 892-5. *ERASTRIA* ? sp.  
Four species.

## PLUSIIDÆ.

896. *INGURIDIA ABROSTOLINA*, But. A. M. Nov. 1879, p. 354.  
Yokohama.  
Mr. Butler places this among the Bombyx.

- 897-8. *ABROSTOLA* ? sp.  
Two species. Yokohama.
899. *PLUSIA* ? sp.  
Yokohama.
900. *PLUSIA RUTILIFRONS*.  
Yokohama.
901. *PLUSIA SIGNATA* ?  
Yokohama.
902. *PLUSIA SIGNATA*.  
Yokohama.
903. *PLUSIA RUTILANS*, But. A. M. Nov. 1879, p. 368.  
*Serena*.  
Yokohama.  
I have received both names for this insect.
904. *PLUSIA GAMMA*.  
Yokohama.
905. *PLUSIA* ? sp.  
Yokohama.
906. *PLUSIA TRANSFIXA*.  
*Abrostola* „  
Yokohama.
907. *PLUSIA VIRGO*, Mots.  
Yokohama.
908. *PLUSIA SPLENDIDA*, But. B. M. 3, p. 23, Pl. 46, f. 8.  
*Diva* „ „  
Yezo, Nikko.
909. *PLUSIA* ? sp.  
Nikko.
910. *PLUSIA SERENA*, But. ? A. M. Nov. 1879, p. 368.  
„ *Pyropia*, But. A. M. Nov. 1879, p. 367.  
Yokohama.  
I have received both names for this insect.
911. *PLUSIA ORICALCEA*.  
Nikko.

912. *PLUSIA* ? sp.

Yezo.

913. *PLUSIA PURISSIMA*, But. B. M. 2, p. 35, Pl. 31, f. 11.

Yokohama.

914. *PLUSIA ORNATISSIMA*, Walk.

Yokohama.

915. *PLUSIA FESTUCE*.

Yokohama.

916. *PLUSIA ZOSIMA*.

Yokohama.

917. *PLUSIA CHRYSITINA*, Mar.

Yokohama.

918. *PLUSIA NADEJA*, Ober.

Nikko.

919. *PLUSIA AGRAMMA*.

Yokohama.

## GONOPTERIDÆ.

920. *GONITIS FRACITIFERA*.

Said to be identical with Jamaica specimens. It is scarce, and I have only taken three, at different times. This is a most wonderful case of disconnected distribution, if Mr. Butler's identification is correct.

Yokohama.

921. *SCOLIPTERYX LIBATRIN*.

Yokohama.

## 922. ? gn. ? sp.

Yoshino.

923. *GONITIS COMMODA*, But. B. M. 2, p. 36, Pl. 32, f. 3.

Yokohama.

## AMPHIPYRIDÆ.

## 924. ? gn. ? sp.

Yoshino.

925. *AMPHIPYRA EREBINA*, But. B. M. 3, p. 23, Pl. 46, f. 12.

Yokohama.



926. AMPHIPYRA ? sp.  
Nikko.
927. AMPHIPYRA SURNIA, Fel.  
Yokohama.
928. APOPESTES INCONSPICUA, But.  
Asamayama.  
I believe this species to be nearer Amphiopyridæ. Mr. Butler places it in Toxocampidæ.
929. AMPHIPYRA ? sp.  
Yezo.
930. AMPHIPYRA TRIPARTITA, But. B. M. 2, p. 36, Pl. 32, f. 4.  
Yoshino.
931. AMPHIPYRA CERVINA, Mots.  
Yokohama.
932. ? gn. ? sp.  
Nikko.
933. ORTHOGONIA SERA, Fel. B. M. 2, p. 36, Pl. 32, f. 6.  
" *Crispina*, But.  
Yokohama.
934. PERINÆNIA LIGNOSA, But. B. M. 2, p. 37, Pl. 32, f. 7.  
Yokohama.
935. NÆNIA CONTAMINATA.  
Yokohama.
936. ? gn. ? sp.  
Nikko.
937. MANIA ? sp.  
Nikko.

## EREBIDÆ.

938. STYNA ACHATINA, But. B. M. 3, p. 26, Pl. 47, f. 7.  
*Picta*, But. " 2, " 40, " 33, " 2.  
*Fumosa*, But. " 2, " 41, " 33, " 3.

*Fuliginosa*, But. B.M. 3, p. 26, Pl. 47, f. 8.

Yokohama, Yezo.

A very variable insect. It is difficult to obtain two specimens exactly alike.

939. *ORTHOGONIA* ? sp.

Nikko.

#### TOXOCAMPIDÆ.

940. *TOXOCAMPA VULCANEA*, But.

Asamayama.

941. *TOXOCAMPA ENORMIS*, But. B. M. 2, p. 38, Pl. 32, f. 9.

Yokohama.

942. *TOXOCAMPA LILACINA*, But. B. M. 2, p. 37, Pl. 32, f. 8.

Yokohama.

943. *DINUMNIA BIPUNCTATA*, But.

Yokohama.

#### FOULLIDÆ.

944. *LACERA PROCELLOSA*, But. A. M. Nov. 1879, p. 368.

Nikko.

#### CALPIDÆ.

Mr. Butler inserts the Calpidæ after *Plusia*, in *Lep. Het.* B. M. part 2, but in the *Trans. Ent. Soc.*, 1881, part 1, he places them in the *Notodontidæ*. I think the first arrangement is correct.

945. *CALPE EXCAVATA*, But. B. M. 2, p. 35, Pl.

Yokohama.

Spins a cocoon interwoven with strips of fibre on the stems of trees.

946. *CALPE* ? sp.

Asamayama.

947. *CALPE SODALIS*, But. B. M. 2, p. 35, Pl. 32, f. 2.

Nikko.

948. *CALPE* ? sp.

*Orasia ? alliciens*, Walk.

Nikko.

949. *CALPE* ? sp.

Nikko.

950. *SEUDYRA SUBFLAVA*, Moore.

Yokohama.

951. *SEUDYRA NOCTUINA*. B. M. part 2, page 3, Pl. 22, f. 1.

Nikko, Yezo.

Mr. Butler places this among the *Bombyx* in the genus *Agaristidæ*. It is, I think, a *Noctua*. It comes freely to sugar, but has a habit of buzzing about it and not settling. It is probably allied to the *Plusiidæ*.

952. *LAGOPTERA ELEGANS*.

Yokohama.

953. *OPHIDERES TYRANNUS*.

Yokohama.

#### CATOCALIDÆ.

954. *CATOCALA NIVEA*, But. B. M. 2, p. 38, Pl. 33, f. 4.

Utsunomiya.

955. *CATOCALA ZALMUNNA*, But. B. M. 3, p. 25, Pl. 47, f. 3.

Yezo, Yokohama, Fujisan.

956. *CATOCALA DULA*, Brem.

Tokio, Kuriles.

957. *CATOCALA* ? sp.

Yezo.

958. *CATOCALA VOLCANICA*, But. B. M. 2, p. 40, Pl. 33, f. 10.

Yokohama.

959. *CATOCALA ESTHER*, But. B. M. 2, p. 40, Pl. 33, f. 9.

Yokohama.

960. *CATOCALA ELIA*, But. B. M. 2, p. 39, Pl. 33, f. 5.

Yezo, Yokohama.

961. *CATOCALA MIRIFICA*, But. B. M. 2, p. 39, Pl. 33, f. 7.

Yokohama.

962. *CATOCALA JONASI*, But. B. M. 2, p. 39, Pl. 33, f. 6.

Yokohama.

## 963-4. CATOCALA ? sp.

Two species.

## 965. CATOCALA NUPTA.

Yezo.

## 966. CATOCALA ? sp.

Yezo.

## 967-8. CATOCALA ? sp.

Two species. Yezo.

## 969. CATOCALA ACTÆA, Fel.

Yokohama.

## 970. CATOCALA ? sp.

Yezo.

## OPINSIDÆ.

## 971. CHRYSORITHRUM AMATUM, Brem.

Nikko, Fujisan.

A very variable insect. I have a long series, no two specimens of which are alike.

## 972. CHRYSORITHRUM SERICEUM, But. B. M. 2, p. 42, Pl. 34, f. 4.

Fujisan.

## OMMATOPHORIDÆ.

## 973. NYCTIPAO CREPUSCULARIS.

,, *latitia*, But. B. M. 3, p. 26, Pl. 47, f. 9.

Yokohama.

## HYPOPYRIDÆ.

## 974. HYPOPYRA DULCINA, Fel.

Yokohama.

## 975. HYPOPYRA MARTHA, But. B. M. 2, p. 41, Pl. 34, f. 3.

Yokohama.

## 976. HYPOPYRA JAPONICA, Men.

Yokohama.

## 977. HYPOPYRA JAPONICA, Men. ?

Yokohama.

978. *HYPOPYRA JAPONICA*, Men. ?  
Yokohama.
979. *SPIRAMA INTERLINEATA*, But. B. M. 2, p. 41, Pl. 34, f. 2.  
“ *rutifasciata*, Men.  
Yokohama.
980. *COCYTODES MODESTA*, Guen.  
Yokohama.  
The larva resembles a brightly coloured centipede.

OPHIUSIDÆ.

981. *ORPHIUSA STUPOSA*.  
Yokohama.
982. ? gn. ? sp.  
Yokohama.
983. *ORPHIUSA ARCTOTENIA*.  
Yokohama.
984. *ORPHIUSA DULCIS*. B. M. 2, p. 42, Pl. 34, f. 5.  
Yokohama.
985. *EUCLIDIA GLYPHICA*. B. M. 2, p. 42, Pl. 34, f. 6.  
“ *consors*, But.  
Yezo.

REMIGIDÆ.

986. *REMIGIA ANNETTA*, But. B. M. 2, p. 43, Pl. 34, f. 7.  
Yokohama.
987. *REMIGIA ARCHESIA*.  
Yokohama.
988. ? gn. ? sp.  
Yokohama.
989. ? gn. ? sp.  
Yokohama.

THERMESIDÆ.

990. *SELENIS LACTA*, But. B. M. 2, p. 44, Pl. 34.  
Yokohama.  
*Capnodes*, *cinerea*, *cremata*, and *Azasia unduligera* I believe to be  
*Pyralis*.

## MODERN TRANSLATION INTO SINICO-JAPANESE.

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BY W. DENING.

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[*Read November 14th, 1883.*]

In presenting to the Society a paper on modern translation into, what it has become the fashion to call, Sinico-Japanese, I have the advantage of coming before you with a subject that, owing to one cause or another, has not been brought up for discussion as frequently as its paramount importance seems to demand that it should be.

The numerous learned and elaborate treatises that have been prepared for this Society on literary subjects have, for the most part, been so many lights thrown upon the hoary ages of antiquity. We have been told how men lived and thought and prayed from the days of Jimmuten to the time of the Shoguns; and how they fought and plotted and oppressed all through the dreary ages of feudalism. With a thorough knowledge of the papers that have been presented to this Society during the past ten years, any one possessing ordinary powers of imagination could work up, for his amusement and diversion, a stage on which the actors and actresses of any given age should appear, dressed according to the fashion of the time, speaking the prose or rehearsing the poetry of the day. The life of the ancient Japanese has been fully portrayed. Their journeys by land, their voyages on the sea, their occupations, and their amusements have all in turn been the subject of investigation.

Affording a pleasing variety to the treatises on Mediæval and Ancient Japan, a number of papers, on all kinds of scientific subjects, have been presented to you by men who have spoken with the

authority of specialists, and who, each in their own department, have rendered most valuable service to the cause of science, whilst they have done much to advance the interests of this Society. In addition to these we have had a number of papers on miscellaneous subjects, most of which have had for their object the illustration of some features of Japanese modern life. The principle which this Society seems to have proceeded on, is that everything Japanese is interesting, and should be investigated and scientifically explained.

Those whom comparative leisure and linguistic attainments have enabled to contribute valuable papers on literary subjects have, as I have already remarked, almost without exception, chosen the ancient rather than the modern world as a field of investigation. In taking this course they doubtless felt that they were doing a work which needed to be done—they were collecting facts of the existence of which the philologist and the antiquarian, the ethonologist and the philosopher, would all alike be glad to be informed, and which would help to explode many old theories, as well as furnish data on which to found new ones.

The feeling then, that they were doing a work, which but few were qualified to do, exploring a field which owing to the barrier of language was unknown to the ordinary students of history, added to that spirit of curiosity and love of knowledge, for its own sake, which, in a greater or less degree, characterizes all real students, has led most explorers to turn away from the modern world and confine their attention to the ancient.

Another cause has doubtless helped to bring this about. There is no denying that, what is called modern literature is in the greatest state of chaos. The old *kosmos* has broken up and no new one has taken its place. Things are taking shape but to lose it again. The work of classification and generalization in the present day is extremely difficult. There are all kinds of styles, and there is a large class of writing and translation that cannot be said to belong to any style. This state of things naturally prevents the student, who has genuine literary taste, from taking any delight in perusing modern books. Where native literature is esteemed for its own sake, it is but natural that that which is native to the core should receive the largest

amount of attention ; and even where study of the language is undertaken, with some object in view that is neither literary nor scientific, all real students find themselves prompted by a desire to examine Japanese thought, as it was in its unalloyed state, before it became mixed with all kinds of foreign elements.

We live in an age in which the publication of a book, which is neither a translation nor a compilation, but which is the result of the author's study and reflection, is one of the rarest things possible. Some of the most advanced native scholars never attempt to publish anything of their own. They prefer to translate or to compile : if not this, then to retail in their own language notions which they have met with in foreign books or native translations. The articles in the newspapers and the weekly and monthly journals are full of thought that has been imported from the West. For one quotation from any ancient Chinese or Japanese author, you will find a dozen from Mill or Spencer, Buckle or Bain. I may remark here that during the past twelve months, as was indicated in one of the leading journals of Tokio not long ago, there has been a strong reaction in favour of Eastern literature, which one is not sorry to see. For the spirit that led men to receive almost everything that came from the West, with implicit confidence, as though owing to the quarter from which it came it must be more worthy of regard than anything in the same line produced here or in the neighbouring continent—the tendency that led men to decide *à priori*, irrespective of the subjects treated, irrespective of the writer's merits or demerits, that the wisdom of the West is far in advance of that of the East, was dangerous in the extreme, and has on the whole been most injurious to the minds of students in this country during the past ten years. In numbers of instances, well understood and well digested Eastern thought has been thrust aside, and the mind has been filled with ill understood and unassimilated Western thought. The morals of Japan and China could not be correct because worked out by consciences that were far removed from Western light and civilization ; and some of the finest and noblest religious sentiments, hopes, and aspirations were made the subject of ridicule, because they happened to find a home in the minds of many who knew nothing of what is called the religious light of the modern world. This has been the spirit of



the age up until very lately; and I have no hesitation in saying that those who have pondered well over the matter, and are intimately acquainted with the history of native thought and sentiment since the revolution of 1868, will agree with me when I say that it is a great cause for congratulation that the intellectual fever and the accompanying delirium which led people to write and say the wildest and most foolish things about the great superiority of everything Western to everything Eastern, is gradually subsiding, and men are beginning to see that neither folly nor wisdom is, or ever can be, the monopoly of any one quarter of the world, or of any one form of government, or of any one civilization. I have said enough to shew that to the ordinary student of Japanese literature, the past has far more charms than the fitful, restless, half-foreign half-native present.

It seems to me, however, that apart from any special object we may have in view, in wishing to make ourselves acquainted with it, there is one consideration of a general character which gives an interest to the study of modern literature in no ordinary way. It is this: the literature of the Meiji era is moulding the thought which is to govern a future generation. We must be blind to facts if we are unable to see that the translations and miscellaneous writings of our day are training up a class of men who will far exceed their ancestors in the amount of intellectual work they accomplish, and in breadth of view and liberality of sentiment. The standard translations of the present day will be handed down to after generations; each possessing its own history; each marking an era of progress in thought; each a fruitful field that has produced germs and seeds that have borne good fruit in thousands of minds. These books are yielding linguistic germs that are beginning to develop to such an extent as to make the language of our day quite a new tongue. Such books as Nishi-Shu's (西周) *Mental Philosophy*, and his *Mill's Utilitarianism* swarm with philosophical terms which are gradually becoming part of the language of ordinary educated and refined speech. Such a work as Garey's translation of the 'Spirit of Laws,' with the large circulation that it has had, will help, in conjunction with a variety of modern works on French law, to settle the legal terms of the country practically for all time. And so on in all other departments of literature and science. Never has the Chinese language been so put to the test. Never has it

shown its capabilities in a more remarkable manner. Despite the difficulties that attend its study, despite its apparent grammarless condition, we doubt whether, for purposes of science and philosophy,—when precision, subtlety, and perspicuity of thought and expression are absolutely indispensable, it is surpassed by any language in existence. The day has yet to come in which an elaborate and exhaustive scientific and philosophical dictionary shall be published, which would make the work of comparing our European terms with their Chinese equivalents an easy task. But during some years, spent in the study of translations of scientific and philosophical works I have been repeatedly struck with the brevity and intelligibleness, as well as with the force of the rendering of these terms, as compared with the original. Some of the numerous examples that are appended to this paper contain illustrations of this remark. The interest then which attaches to the study, to which I am inviting your attention, is just this: here is a language, in many respects the most remarkable in the whole world, which for centuries was unknown in the West, suddenly called upon, here in Japan (I say here in Japan, for compared to the translations produced in this country, those prepared in China are very scanty) to express thought which has been elaborated by Western minds: it is found capable of doing it elegantly, forcibly, and above all, accurately and fully. Listen for a moment to a few illustrations taken from a small book entitled ‘Dictionary of Philosophy,’ prepared by some of the native teachers at the Tokio University, and imagine yourself giving a lecture on some subject in which the following terms had to be repeated thirty or forty times, and say whether the Chinese would not be preferred to the Anglicised Greek or Latin originals. Would you not prefer to have to repeat—

Gekidō 激動	sayo 作用	rather than	Excito—motor action and
Nendō 念動	sayo 作用.....	“ .....	Idio motor action
Kuwannen 觀念	rengō 聯合	“ .....	Association of ideas
Fukujū 副從	genin 原因 .....	“ .....	Concomitant cause
Rikken 立憲	seiji 政治 .....	“ .....	Constitutional government
Bunkai 分解	dantei 斷定.....	“ .....	Analytic judgment
Shōmei 證明	meidai 命題 ...	“ .....	Demonstrative proposition
Risetsu 離攝	meidai 命題 ...	“ .....	Disjunctive proposition

Chozetsu 超絶 gaku 學 rather than Transcendentalism<sup>1</sup>  
 Kuwatai 化体 ..... “ ..... Transubstantiation  
 Gōri 合理 shingaku 神學 ... “ ..... Rational theology  
 Tekishu 適種 seison 生存 ... “ ..... Survival of the fittest

In terms, what is most desired is brevity, perspicuity, and definiteness ; all these characteristics the Chinese terms possess in an eminent degree. Dr. Groth, in a paper read before the German Asiatic Society, a translation of which appeared in the *Chrysanthemum* for January last, says:—“ In western lands the fact that China’s intellectual development stands, and has long stood, very high, is attracting notice more and more ; while Chinese philosophy and ethics especially, and the advantage of the Chinese ideograph, so long contemned, are more and more realized. It is now well known that the Chinese can express the finest and most difficult thought, perhaps more clearly than any other tongue ; and that they can easily incorporate new-found or newly-imported ideas, and express them by new characters or combinations of old ones.” Max Müller, in his essay on the stratification of language, says : “ Every shade of thought that finds expression in the highly-finished and nicely-balanced system of Greek tenses, moods and particles, can be expressed, and has been expressed in that infant language by words that have neither prefix nor suffix, no terminations to indicate number, case, tense, mood or person.” [Selected Essays, vol. I. p. 41.]

The Chinese language, then, as a vehicle for conveying Western thought, being fully equal to the demands that are made on it, the study of what is usually called Sinico-Japanese cannot but be of the greatest interest and importance to all who are engaged in introducing Western ideas into this country. It is with a view of encouraging this study that I have undertaken to prepare a paper on modern translation, in which I shall, first, state what I conceive to be those fundamental principles, the strict observance of which has been the secret of success with the best translators ; and secondly, I shall make some general observations on the character of the translations that have been published in this country ; and lastly, present a number of examples which will shew the various styles of modern Sinico-Japanese in use.

Various definitions of the term ‘ translation ’ have been given by those who have had occasion to speak or write on the subject. But nothing is

more common<sup>•</sup> than to hear a good definition of any given word or subject stated at the commencement of a treatise, or a lecture, utterly ignored,—in fact annihilated beyond all hope of a resurrection in the course of the discussion that follows. This comes about from men having some line of action to defend, which cannot be defended, unless the subject in hand is discussed in a certain way. With this class of persons it is useless to argue; their opinions rest on no rational basis, and therefore they are not to be altered by rational considerations. They are not open to conviction, because they are not free to discuss the question on its own merits, with an unbiassed mind, and apart from all side issues. This is particularly the case with regard to translation. If our view as to what is the true ideal of translation is correct, then we can make no exceptions as to the subject matter translated. One book will be the same as another. Homer, the Daigaku and the New Testament must all stand on the same level. Whatever definition we give of the term 'translation,' we must be prepared to adhere to it without respect to the subject matter translated; if not, then our definition is imperfect and practically useless, and it had better be replaced by one that more adequately expresses our own views of the nature of the thing we are engaged in defining. If we are prepared to agree to the definition that declares translation to be the transference of thought from one language to another; or to that of Webster, that it is something that expresses the sense of, in the words of another language, then we must be prepared to stand by this definition, and make it our guide in the discussion of the various branches of the subject, as well as in the actual work of translation.

One frequently hears the remark made—that we have no right to interpret the meaning of the authors we are translating: we must give his words as they stand, and leave each reader of our translation to interpret them as he pleases. Now this notion is wholly destructive of the idea of translation conveyed by the above definition; and to allow of its being entertained, we must alter our definition and let it run thus:—Translation is the 'transferring of words from one language into another.'

Now as it happens, if the figurative as well as the literal meaning of

words be taken into consideration, there are no two words belonging to different languages whose meaning and use precisely correspond. Where we depart from the literal and come to the figurative meaning of words, taken separately or collectively, as they stand in short phrases or sentences, we find that ideas are expressed by terms which, understood in their literal sense, do not correspond in any way. This will be specially the case when the language from which we are translating has no affinity with the tongue in which we are endeavouring to express thought. For example, to transfer thought from one Aryan language to another, or from one Semitic language to another is far easier than to transfer thought from a Semitic or Aryan language to a Turanian one. As Max Müller and Julien have pointed out, 'all translations made from other languages into Chinese, owing to the analytic nature of that language, appear like a gloss.'

The idea, then, that the translator is to be no interpreter of the sense of the author he is translating, is crude in the extreme and cannot for a moment be allowed to influence us in the work of translation. If the sense of a passage is to be accurately conveyed, it must be clearly apprehended, and clear apprehension is a result of a longer or shorter process of reasoning on the passage in hand ; its possible meanings are one after the other taken into consideration, and the correctness of final decision, as to what it does mean, depends entirely on the exercise of the faculty of judgment or the amount of critical acumen possessed by the translator, and to this rule there are no exceptions, whatever the subject matter to be translated happens to be. To some, it is a source of regret that thought, when translated into Chinese, loses the form with which they are familiar, and assumes one that seems to them uninteresting. I cannot say that as far as my limited experience goes, this has been the case with me. Ideas do not seem to me to lose any of their interest or power by being translated into Chinese. Take a good illustration of this in what is called the Delegates' Version of the New Testament. This is perhaps to be ranked among the very best translations that have appeared in the Chinese language. Can we say that the beauty of style, that the strength of the argument of some of the finer passages of the original are lost in the process of translation ? Do the thoughts refuse to clothe themselves in Chinese attire ? Does the conciseness, the

pathos, the fine antithesis of the language with which we are all familiar fail to appear in the idiomatic translation of which we are speaking? Take a few examples :—

“For circumcision verily profiteth, if thou keep the law : but if thou be a breaker of the law, thy circumcision is made uncircumcision.”

Nanji hō ni shitagawaba sunawachi katsurei yeki ari, nanji hō wo okosaba sude ni kassu to iyedomo, imada kassezaru ga gotoku shikari.<sup>1</sup>—*Rom. II : 25.*

Again : “For the word of God is quick, and powerful, and sharper than any two-edged sword, piercing even to the dividing asunder of soul and spirit, and of the joints and marrow, and is a discerner of the thoughts and intents of the heart. Neither is there any creature that is not manifest in his sight : but all things are naked and opened unto the eyes of him with whom we have to do.”

Kedashi Shōtei no satoshi kuwap-patsu, hattchi, mizukara kōkō ari, hōjin yori mo toshi ; oyoso shinki, kotsu-zuye bōshi sezaruru koto naku, shin-no-i-nen kuwan-satsu sezaruru koto nashi. Yuye ni Shōtei no maye ni oite, bam-butsu kakururu wo yezu, kuwatsu-zen to shite, ken-roshi hitoshiku ware wo kiku suru no Shu no miru tokoro to naru nari.—*Heb. IV : 12, 13.*

What could be more concise and forcible than the rendering of these words :

“And beside this, giving all diligence, add to your faith virtue ; and to virtue knowledge ; and to knowledge temperance ; and to temperance patience ; and to patience godliness ; and to godliness brotherly kindness ; and to brotherly kindness charity.”

Yuye ni masa ni bim-ben subeshi. Shin areba, yoroshiku toku arubeku ; toku areba, yoroshiku chi arubeku ; chi areba, yoroshiku setsu arubeku ; setsu areba, yoroshiku nin arubeku ; nin areba, yoroshiku ken arubeku ; ken areba, yoroshiku tei arubeku ; tei areba, yoroshiku jin arubeshi.—*2 Pet. I : 5, 6, 7.*

“But speaking the truth in love, may grow up into him in all things, which is the head, even Christ : From whom the whole body fitly

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<sup>1</sup>The Chinese of this and the following passages will be found among the Examples of translation given in the after part of the paper.

joined together and compacted by that which every joint supplieth according to the effectual working in the measure of every part, maketh increase of the body unto the edifying of itself in love."

Kirisuto kiyō-kuwai no Shu tari: Nanji jin ni ite, jitsu wo ii, banji koré ni taku shite, seichō su; Kirisuto ni yotte zen-tai ren-raku kiyō-ko hiyaku setsu ai-uke, sai ni yotte undō su; yuye ni yoku seichō shite jiū shu suru ni jin wo motte su.—*Ephes. IV: 15, 16.*

"When a strong man keepeth his palace, his goods are in peace: But when a stronger than he shall come upon him, and overcome him, he taketh from him all his armour wherein he trusted, and divideth his spoils. He that is not with me is against me: and he that gathereth not with me scattereth."

Sore yūshi kat-chiu wo megurashite, kiu wo mamoreba, sunawachi aru tokoro no mono anko nari: tada sara ni yūsha itarite, kore ni kachi, sunawachi sono tanomu tokoro no kat-chiu wo ubaute, sono zō wo wakachi: ware to tomo ni sezaru mono wa sunawachi ware wo seme, ware to osamezaru mono wa sunawachi sanzuru nari.—*Luke XI: 21, 22, 23.*

"The light of the body is the eye: therefore when thine eye is single, thy whole body also is full of light; but when thine eye is evil, thy body also is full of darkness. Take heed therefore that the light which is in thee be not darkness. If thy whole body therefore be full of light, having no part dark, the whole shall be full of light as when the bright shining of a candle doth give thee light."

Sore, mi wo shoku-shō suru mono wa me nari; me akiraka nareba, sunawachi zen-shin hikari; me kurakereba zenshin kurashi: kore wo tsutsushimeyo nanji no hikari wo kuramasu nakare; moshi zenshin hikari arite ichi gō no an nakereba, sono hikari matten shite tō no kō-yen nanji wo terasu ni nitari.—*Luke XI: 34-36.*

In the above passages we have the meaning of the original expressed in language that is as elegant as it is correct. Much of the language of morality and of religion consists of pithy sayings, that sound like adages, or proverbs, and of whose general truth no one doubts. Now, these sayings owe much of their axiomatic power to the force, pithiness and fascination which certain words combined with certain other words, in a special way, invariably possess. How is it that our great authors

so frequently express their thoughts, whether consciously or unconsciously, by a series of quotations from the works of others—by a grouping together of a number of phrases of acknowledged power and beauty, which phrases in the strife of words have won for themselves a position which, as long as human speech affords the best means of expressing thought, they are in no danger of losing? Eloquence—what is it, but to have these phrases at your command? In what does the charm and fascination of the most polished literary style consist? Is it not, that in it thoughts are expressed with care, elegance, and power, by the use the writer makes of certain words in preference to certain others, by his adoption of language that is concise, entertaining, and spirited, rather than that which is discursive, dull, and spiritless?

If translation aims at making the thoughts that are expressed in one tongue to be esteemed when expressed in another, and the language into which they are rendered to be quoted with pleasure, to be looked upon as proverbial by those for whose benefit the translation is prepared, then the notion, which one so often hears defended—that as long as the sense of the original is given in plain language, which everybody can comprehend, all that is required will be accomplished, can no longer be entertained. This theory is based on a fiction; viz., on the idea that the sense of any given passage is not its soul, and that its soul is an uncompounded essence; that is, that it does not owe its very existence to a nicely balanced, a harmoniously blended organization. Alter the words of any of the great sayings of ancient or modern writers, and see how soon the spirit goes out of them!—and how, shorn of that in which their strength consists, they descend to the level of ordinary speech! It is because the translators are so numerous, who fail to recognize this, that so many undertake to translate who are in no way qualified for the task: and as a natural result, so many books have been issued that neither express the meaning of the original, nor in many instances, any other meaning. Did space allow of it, I could give numbers of illustrations of this class of so-called translation. The author of the *Sai Koku-Ris-shi-ben* (西國立志編), from which I have quoted below, says that the one great difficulty he found in translating "Smiles' Self-Help" was in connection with the conveyance of the soul and spirit of the original: the literal meaning of the text,—that, he could give; but how to make



his translation as forcible in Sinico-Japanese as the original is in English, he did not know. This remark shows that the author of the work, of which we are speaking, is endowed with genuine literary taste and insight. Some translators seem unconscious of the fact, that the best books all have souls; and so they make no attempt to cause their presence to be felt in the translations they produce. Dr. Legge has published volumes of translation from the Chinese Classics, and according to most critics, as a rule, his renderings represent the meaning of the original; but no one who is well acquainted with the grand old sayings of the Chinese sages, as they stand in the original, will be so blind as not to see that rendered literally, as they are in Legge's translations, they have lost much of their power. The Chinese soul has gone out of them, and no English one has been created to take its place. They lie, do many of these sayings, like so many soulless bodies, which bear the marks of once being the tabernacles of life, power, and expression, but which now are cold and motionless: and one has a desire to see them buried out of sight, unless the literary anatomist wishes to retain them for scientific purposes. By these remarks, I do not wish to convey the idea that I think literal translations useless: in certain cases it is very desirable to have them, but assuredly in the case of books of acknowledged literary merit, in addition to the literal rendering of the text some attempt should be made to reproduce in the translation the style, beauty and expressiveness of the original. Let me illustrate my meaning by a few quotations from Dr. Legge's translations. The passage in the *Chingo* that runs as follows:

'Ki-do-ai-raku no imada hassezaru kore wo chiu to iu; hasshite, shikoshite mina setsu ni ataru, kore wo kuwa to iu; Chiu wa Tenka no tai-hon nari: Kuwa wa Tenka no tatsudō nari. Chiu-Kuwa wo itashite, Tenchi kurai shi bambutsu iku su.'

Is translated:

'While there are no stirrings of pleasure, anger, sorrow, or joy, the mind may be said to be in the state of *Equilibrium*. When those feelings have been stirred, and they act in their due degree, there ensues what may be called the state of *Harmony*. This *Equilibrium* is the great root from which grow all the human actions in the world, and this *Harmony* is the universal path which they all should pursue. Let

the states of equilibrium and harmony exist in perfection and a happy order will prevail throughout heaven and earth, and all things will be nourished and flourish.'—*Legge's Life and Teaching of Confucius, 5th edition, p. 284.*

Again there is a well known passage in the Dai-gaku that runs as follows :

'Shi ni iu kano ki-iku wo mireba riku-chiku itari, hi aru kunshi, setsu suru ga gotoku, sa suru ga gotoku, taku suru ga gotoku, ma suru ga gotoshi, hit-tari, kan-tari, kaku-tari, ken-tari, hi aru kunshi, tsui ni wasurubekarazu to. Setsu suru ga gotoku, sa suru ga gotoshi to wa, gaku wo iu nari: Taku suru ga gotoku, ma suru ga gotoshi to wa—mizukara osamuru nari: hit-tari, kan-tari to wa—jun-ritsu nari: kaku tari, ken tari to wa—igi nari hi-taru kunshi, tsui ni wasurubekarazu to wa—sei-toku, shizen tami no wasururu koto atawazaru wo iu nari.'

Legge's translation of the above is as follows :

"In the Book of Poetry, it is said, 'Look at that winding course of the K'e with the green bamboos so luxuriant! Here is our elegant and accomplished prince. As we cut and then file, as we chisel and then grind, so has he cultivated himself. How grave is he and dignified! How majestic and distinguished! Our elegant and accomplished prince never can be forgotten. That expression 'as we cut and then file' indicates the work of learning. 'As we chisel and then grind' indicates that of self-culture. 'How grave is he and dignified!' indicates the feeling of cautious reverence. 'How commanding and distinguished' indicates an awe-inspiring deportment. 'Our elegant and accomplished prince never can be forgotten' indicates how, when virtue is complete and excellence extreme, the people cannot forget them.'—*Legge's Trans. of Great Learning, p. 270.*

Again these words of Mencius :

'Yue ni ten masa ni Tai Nin wo kono hito ni kudson to suru ya, kanarazu, madzu sono shin shi wo kurushime, sono kin kotsu wo rō shi sono taifu wo uyashi, sono mi wo kū bō ni shi, okonai, sono nasu tokoro ni futsuran su, motte kokoro wo ugokashi, sei wo shinobi, sono atawazaru tokoro wo Zoyeki suru tokoro nari Hito tsune ni ayamatte, shikōshite nochi ni yoku aratamu, kokoro ni kon shi, riyo ni kō shite shikōshite nochi ni okori, iro ni chō shi, koye ni hasshite, shikoshite nochi ni satoru.'

Are translated as follows :

"Then, when heaven is about to confer a great office on any one, it first exercises his mind with suffering, and his sinews and bones with toil ; it exposes his body to hunger, and subjects him to extreme poverty ; and it confounds his undertakings. In all these ways it stimulates his mind, hardens his nature, and supplies his incompetencies. Men constantly err, but are afterwards able to reform. They are distressed in mind, and perplexed in thought, and then they arise to vigorous endeavour. When things have been evidenced in men's looks, and set forth in their words, then they understand them."—*Legge's Life and Work of Mencius, Vol. II. 1875, p. 61.*

Owing to the immense difficulty connected with the choice of words and phrases in another tongue, that, combined, shall have the same general effect on the mind of an ordinarily intelligent reader as that produced by the original : we may say that when the language in which thought is to be conveyed has no affinity whatever to that from which we are translating, that works written in poetical language, and those whose charm consists, for the most part, in witty sayings, and subtlety of expression, must be pronounced untranslatable. The thoughts expressed by Shakespeare, for instance, are so closely interwoven with our history as a people, and with the history of our language, that translated into the tongue of a people whose history, habits of thought, differ *in toto* from that of the English, what meaning could the translation possibly convey unless transformation was carried on to the extent of producing an entirely new work ? If any one is anxious to see what cannot be done in this line, let him try to produce in Sinico-Japanese, or any other kind of Japanese, some of the more characteristic parts of Shakespeare's comedies. Let him commence with *Dogberry's* speeches in "Much Ado About Nothing," and then proceed to try his hand on *Beatrice's* wit, or attempt any other part of Shakespeare's writings where the strength and beauty of the passage depends upon the subtle or the double meaning of words and phrases. No amount of skill and ingenuity would enable one to translate into Japanese some of the finer passages of our great poets and writers of fiction, so as to preserve intact the peculiarity of the original.

But there is a large class of writing which yields itself easily to translation :—historical, scientific, and philosophical works,—those

books whose style appears to the habitual novel-reader to be dry and uninteresting. These can be reproduced by a painstaking and skilful linguist, so as not to entail the loss of a single shade of thought, as will be shewn by the numerous examples given below. The standard works of the day consist, almost without exception, of the translations of our matter-of-fact prose works, in which the imagination is kept in abeyance, and induction and deduction reign supreme. The higher class philosophical style and the popular scientific style both alike use illustrations very sparingly ; partly because those for whom these books are written do not need illustrations to enable them to comprehend even the deepest thought, when the language in which it is expressed is transparent ; and partly because it is felt that images are apt to lead astray. Thought is endeavouring to work itself clear of all that is accidental, transitory and limited, and to generalize more and more, till in every region which it traverses it finds a universal in which to rest. This tendency of modern thought has the effect of making it capable of being rendered into any language whose vocabulary is of sufficient extent to supply equivalents in the way of terms and exact phrases. These considerations account for the fact that among modern translations into Sinico-Japanese, the translation of philosophical and scientific works are more accurate renderings of the original than those belonging to any other class of writings.

It is high time that we said something about the qualifications that are absolutely essential for the carrying on of the higher class translation in this country. We take it for granted that the translator, be he native or foreign, should start in possession of the advantages that a good liberal education alone can supply, and that he has studied thoroughly two or three foreign languages as well as read most of the standard works on philology. As a preparation for the work of translation into Sinico-Japanese, he should be well acquainted with the Chinese Classics ; as well as have read carefully most of the modern standard translations that have been produced in this country. He should have a thorough knowledge of the Japanese colloquial language, in order to be able to discuss the most minute points with his teacher when examining the works of other translators. If a foreigner, I would advise him to begin, continue and end his career as a translator with

none but native scholars, who know no English, as assistants. The plan of employing a man who can read English, and who can render a sentence into Japanese with greater ease and precision than his employer, has been fatal to success in translation work in the case of a large number of translators in this country. The work may be done quicker, and at first far better by the native, than by the foreigner; but depend upon it, that the adoption of this plan will prove to be the crutch that lames for life, and will make the foreign assistant of the Japanese translator feel what a nonentity he is: and that it is utterly hopeless for him to expect to equal much more to excel the native, who is working with him. If he steer clear of the rock on which so many make shipwreck; and from the very commencement of his studies a foreigner accustoms himself to translate from Japanese into his own tongue, and from his own tongue into Japanese without any help whatever, except in the way of the correction of grammatical mistakes and improvement of the style of his Japanese; and this is carried on through a succession of years, the student endeavouring to take higher and higher flights as his wings grow stronger and his courage increases, I see no reason why a foreigner should not attain to a knowledge of this language sufficient to enable him to translate idiomatically and well. His acquaintance with the best native works would furnish him with an extensive vocabulary, and familiarity with the higher class literary styles of China and Japan would enable him to imitate them to a very considerable extent. Though after all he probably would not rank among the very best translators in the land, yet he would be far above the average. And it is more than probable that, in subjects with which he was specially well acquainted, hardly any native would be found to compete with him. And as for his position as a critic of the works of others, with his extensive acquaintance with Western literature, there would be few natives, if any, who would be more competent than he. A wide sphere of labor awaits the critic in this country. All the more important modern translations need to be thoroughly reviewed and made the subject of lengthy critical essays.

I have in this paper confined myself, principally, to the preparation of examples of modern translation, extracted from various authors, with remarks on the style, the meaning of the words employed, etc. I have

been obliged to curtail criticism considerably, for fear of making the paper tediously long. I have quoted, chiefly, from philosophical works rather than from historical or scientific ones, owing to the fact that it is generally acknowledged that the former are more difficult to translate than the latter, my object in this paper being to shew what Sinico-Japanese is capable of. On some future occasion I hope to take up some one standard work, and prepare a thorough review of the same, with a full account of the terms it contains and a notice of the merits or demerits of the translation as a whole.

Among the examples given below, there are one or two instances in which a certain amount of difficulty or intricacy in the original seems to have prevented the native translators from apprehending the meaning of the passage : this has led to obscurity in the translation. On these occasions I have ventured to suggest a translation of my own.

I am not without hopes that this paper will prove of some use to all students of the language, as well as lead some of our advanced students to give us their opinion on the various topics suggested by the line of argument adopted and defended therein.

For want of space, I have been obliged to omit quoting from a large number of books that are well worthy of notice. I intended inserting a few passages from the translation of Mr. Spencer's 'Data of Ethics,' but after examining the translation prepared by one Yama-guchi Matsugoro, a man whose name as a translator seems to be little known, I found that the book was not worth quoting from. Other works that have been examined were not made use of for the same reasons. Some works I should have been glad to have used had I been able to obtain copies of the same. The translation of Mr. Spencer's work on "Education" is one of these.

Before proceeding to give examples illustrative of the remarks made in this paper, I wish to say a word in reference to a term which has been employed to describe what in plain language is Japanese-Chinese. I refer to the term 'Sinico-Japanese.' You will perceive that I have used this term in a very wide sense, and made it include all styles of writing, from that in which there is a large mixture of colloquial, to that that may be called pure Chinese style, in which the characters are placed in the same order as they would be in China, with *Kun ten* supplied for the convenience of the Japanese reader. Whether it would

not be more correct to describe this mode of writing as pure Chinese, is a question. As a matter of fact, however, it by no means attains to the purity of classical Chinese, invariably possessing some foreign elements: then it is read as Japanese, and not as Chinese. We therefore have seen no object to be gained by our drawing a line of demarcation between the style adopted by Nishi Shu in his *Shinri-gaku* (心理學) and that employed in his *Rigaku* (利學), apart from a certain amount of stiffness that attaches itself to the latter as compared to the former, the only difference being that one is read straight down and the other not.

The quotations from Chinese books may seem out of place in a paper on translation into Sinico-Japanese, but the use to which Chinese is put here, is precisely similar to that of China, and therefore when I wished to shew what is the capacity of the Chinese language, as a vehicle of thought, it made no difference whether the quotation was from a book produced in China or Japan. Nor does the order in which the characters are read, or slight variations in the use of characters and the meanings attached to them, at all affect the line of argument followed in this paper. It is well to mention that in quoting from American editions of English works I have left the spelling as I found it.

A careful perusal of the following examples will verify the assertion, constantly made in this short treatise, and will shew that the Chinese language, whether as it is used by the Japanese or by the Chinese, is capable of expressing the deepest and most refined thought, as clearly if not more clearly than any language in existence.

### EXAMPLES.<sup>2</sup>

#### I.

Taken from Nakamura Masanao's 中村正直 translation of "Smiles' Self-Help," entitled *Saikoku-risshi-hen*, 1st edition, pub. 1867.

"Heaven helps those who help themselves" is a well-trying maxim, embodying in a small compass the results of human experience.

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<sup>2</sup>It was intended to print the Chinese and English in parallel columns, or one after the other; but owing to various difficulties that presented themselves the plan of printing the original and the translation separately has been adopted. This will explain how it is that in certain parts of this paper the translation is spoken of as "the above passage," etc.

"The spirit of self-help is the root of all genuine growth in the individual ; and exhibited in the lives of many, it constitutes the true source of national vigor and strength. Help from without is often enfeebling in its effects, but help from within invariably invigorates.

"Whatever is done *for* men or classes, to a certain extent takes away the stimulus and necessity of doing for themselves ; and where men are subjected to over-guidance and over-government, the inevitable tendency is to render them comparatively helpless.

"Even the best institutions can give a man no active help. Perhaps the most they can do is to leave him free to develop himself and improve his individual condition. But in all times men have been prone to believe that their happiness and well-being were to be secured by means of institutions rather than by their own conduct. Hence the value of legislation as an agent in human advancement has usually been much over-estimated."

A well-tried maxim, 確然經驗シタル格言。Over-estimated, 分外ニ貴トメル。Institutions, 法度。

(Smiles' Self-Help, p. 21, 22, Amer. edition.)

The translation of Self-help is Jijoron 自助論。The title Sai koku-risshi hen 西國立志編 is given with a view of indicating the nature of the original work in a fuller manner than a literal translation of Self-help would be likely to do.

## II.

"It may be of comparatively little consequence how a man is governed from without, whilst everything depends upon how he governs himself from within. The greatest slave is not he who is ruled by a despot, great though that evil be, but he who is the thrall of his own moral ignorance, selfishness, and vice.

"Nations who are thus enslaved at heart cannot be freed by any mere changes of masters or of institutions ; and so long as the fatal delusion prevails, that liberty solely depends upon and consists in government, so long will such changes, no matter at what cost they may be effected, have as little practical and lasting result as the shifting of the figures in a phantasmagoria.

"The solid foundations of liberty must rest upon individual



character ; which is also the only sure guarantee for social security and national progress. John Stuart Mill truly observes that "even despotism does not produce its worst effects so long as individuality exists under it, and whatever crushes individuality is despotism, by whatever name it be called."

Fatal delusion 不祥ノ謬説

Individuality 箇々自立

Phantasmagoria 玻璃鏡

Despotism 霸政 or 虐政

(Idem p. 23.)

### III.

"In short, to perform the work which he did, extending over so long a period, in the face of so many administrations, week after week, year after year, to be out-voted, beaten, laughed at, standing on many occasions almost alone, to persevere in the face of every discouragement, preserving his temper unruffled, never relaxing in his energy or his hope, and living to see the greater number of his measures adopted with acclamation, must be regarded as one of the most remarkable illustrations of the power of human perseverance that biography can exhibit.—(Idem p. 143.)

The freedom of the above translation amounts almost to paraphrasing. And yet it is unlike paraphrase, in that the meaning of the original is expressed in a fewer instead of a larger number of words than are found in the original. Many expressions are left out altogether, such as 'out-voted, beaten' and, 'preserving his temper unruffled'; 'adopted with acclamation' is rendered by *Yoni okonawaruru* 世ニ行ハル。 The words 'that biography can exhibit', are left out altogether. In our opinion, this passage is in every way inferior to the examples given above.

### IV.

"If we can observe and classify the phenomena of nature, in her varied forms, animate and inanimate, and ascertain in this way the laws to which she is subject ; if it is possible thus to construct a science of plants, of animals, of the elements that compose the substance of the earth, of the strata that lie arranged beneath its surface, of the forces and agencies that at any time, recent or remote, have been at work to

produce the changes which have taken place upon and within our globe; nay, more, if leaving our own planet we may, by careful observation of the heavenly bodies, learn their places, movements, distances, estimate their magnitude and density, measure their speed, and thus construct a science of the stars, surely the phenomena of our own minds, the data of our own consciousness, must be at least equally within our reach, and equally capable of observation, classification and scientific statement. If we can observe the habits of animals and plants, we can observe also the habits of man, and the phenomena of human thought and passion. If the careful induction of general truths and principles from observed facts form the basis and method of true science in the one case, so in the other.

Phenomena of nature	萬有ノ現象	Density	鹿蜜
Animate and inanimate	生體非生體	Consciousness	意識
Elements	現行	Passion	情欲
Strata	地層	Induction	歸納
Forces	靜力	General truths	普通真理
Agencies	動力	Basis and method	基礎方法
Magnitude	大小		

This example is well worth careful analysis. The precision, fullness and spirit with which the original is rendered is very remarkable; the translation is very literal and yet thoroughly idiomatic. The long sentence in the original beginning with the word 'if' and closing with the words 'scientific statement,' loses none of its eloquence and power in the process of translation. We take this to be an example of high class translation. The style and ease of the whole passage are plain indications that it is the production of a master hand.—*Haven's Mental Philosophy, improved edition, 1881, p. 17.*

## V.

'To doubt our own consciousness is to call in question our very doubt, since the only evidence of our doubting is the consciousness that we doubt.'—(Idem p. 19.)

'Identity is not *similarity*, not mere resemblance—*similar* things are not the *same* thing. We may suppose two globes, or spheres precisely alike in every respect; of the same size, color, form, of the same

material, of the same chemical composition and substance, presenting to the eye and the touch, and every other sense, the very same appearance and qualities, so that, if viewed successively, we should not recognize the difference ; yet they are not identical ; they are, by the very supposition, two distinct globes, two entities, two substances, and to say that they are identical, is to say that two things are only one. *Similarity* is not identity ; so far from it, as Archbishop Whateley has well remarked, it is not even implied of necessity in identity. A person may so far change as to be quite unlike his former self in appearance, size, etc., and yet be the same person. Not only are the two ideas quite distinct, but the one may be and in fact is, in most cases, the virtual negation of the other.'—(Idem p. 249.)

Identity 同一

Supposition 假設

Similarity 類似

Chemical composition and substance 化學上ノ混合實質

Virtual negation of the other 他ノ一ト並立スルヲ拒ムノ能力ヲ有シ得

Entity 本體

Idea 觀念

Substance 實體

## VII.

‘Laws in their most general signification are the necessary relation arising from the nature of things. In this sense all beings have their laws ; the Deity his laws (Plutarch says ‘Law is the king of mortal and immortal beings’), the material world its laws, the intelligences superior to man their laws, man his laws.

‘They who assert that a *blind fatality* produced the various effects we behold in this world talk very absurdly ; for can anything be more unreasonable than to pretend that a blind fatality could be productive of intelligent beings ?

‘There is, then, a prime reason ; and laws are the relations subsisting between it and different beings, and the relations of these to one another.

‘God is related to the universe, as creator and preserver ; the laws by which he created all things are those by which he preserves them.’

Immortal beings 諸神

Prime reason 理ノ元行タルモノ

Intelligences 靈覺者

Blind fatality 無心氣數

—('Spirit of Laws,' by Montesquieu. Trans. from French by Dr. Nugent, new edition, 1878, p. 1.)

## VIII.

The laws of education are the first impressions we receive, and as they prepare us for civil life, every private family ought to be governed by the plan of that great household which comprehends them all.

'If the people in general have a principle, their constituent parts, that is the several families, will have one also. The laws of education will be therefore different in each species of government: in monarchies they will have honour for their object; in republics, virtue; in despotic governments, fear.'—(Idem p. 31.)

## IX.

'In cold countries they have very little sensibility for pleasure; in temperate countries their sensibility is exquisite. As climates are distinguished by degrees of latitude, we might distinguish them also in some measure by those of sensibility. I have been at the opera in England and in Italy, where I have seen the same pieces and the same performers; and yet the same music produces such different effects on the two nations: one is so cold and phlegmatic, and the other so lively and enraptured, that it seems almost inconceivable.'—(Idem. p. 230.)

Sensibility for pleasure 薙樂ニ誘セラルモノ

Climates 風土ノ寒暖

Performer (at opera) 俳優

Inconceivable 思議ノ外ニアリ

Mr. Ga Reishi 何禮之 states in the preface to his work that his translation is a literal one, but no impartial judge could possibly entertain this opinion in reference to the book. There are numerous passages translated literally, but on the whole we should say that the translation should be designated *iyaku* 意譯 rather than *choku yaku* 直譯.

## X.

'The heat of the climate may be so excessive as to deprive the body of all vigour and strength. Then the faintness is communicated to the mind ; there is no curiosity, no enterprise, no generosity of sentiment ; the inclinations are all passive ; indolence constitutes the utmost happiness ; scarcely any punishment is so severe as mental employment ; and slavery is more supportable than the force and vigour of mind necessary for human conduct.'

No curiosity 奇事異聞求メズ

No enterprize 事業ヲ企圖セズ

Inclinations are all passive 精神萎靡シテ自奮ノ志ヲ發スルヲ能ハズ

The words 'no generosity of sentiment' are not translated.

## XI.

'We do not find in history that the Romans ever killed themselves without a cause, but the English are apt to commit suicide most unaccountably ; they destroy themselves even in the bosom of happiness. This action among the Romans was the effect of education, being connected with their principles and customs ; among the English it is the consequence of a distemper, being connected with the physical state of the machine, and independent of every other cause. It is evident that the civil laws of some countries may have reasons for branding suicide with infamy, but in England it cannot be punished without punishing the effects of madness.'—(Idem. p. 249.)

The translation of the passage commencing 'This action among the Romans etc.,'—by 'Somezomo Roma-jin ni kono akuheki naki wa etc.,' is misleading ; the action referred to in the original is the action of suicide, taken in the abstract, and not that special kind of suicide which the author says the English are in the habit of practising. This misapprehension of the meaning of the original is very common among Japanese translators. The author of the original work adds a note of explanation to the above extraordinary remark, which runs thus : " It may be complicated with the scurvy, which in some countries especially renders a man whimsical and insupportable to himself."

## XII.

‘Were I to vindicate our right to make slaves of the negroes, these should be my arguments:—The Europeans, having extirpated the Americans, were obliged to make slaves of the Africans for clearing such vast tracts of land. Sugar would be too dear if the plants which produce it were cultivated by any other than slaves.

‘These creatures are all over black, and with such a flat nose that they can scarcely be pitied.

‘It is hardly to be believed that God, who is a wise Being, should place a soul, especially a good soul, in such a black ugly body.

‘It is so natural to look upon colour as the criterion of human nature, that the Asiatics, among whom eunuchs are employed, always deprive the blacks of their resemblance to us by a more opprobrious distinction. It is impossible for us to suppose these creatures to be men, because allowing them to be men, a suspicion would follow that we ourselves are not Christians.’—(Idem p. 257.)

## XIII.

‘The opinion which it is attempted to suppress by authority may possibly be true. Those who desire to suppress it of course deny its truth; but they are not infallible. They have no authority to decide the question for all mankind, and exclude every other person from these means of judging. To refuse a hearing to an opinion, because they are sure that it is false, is to assume that their certainty is the same thing as absolute certainty. All silencing of discussion is an assumption of infallibility.’—(Mill’s ‘Liberty,’ 7th ed. Boston, 1871, p. 36.)

## XIV.

‘But the price paid for this sort of intellectual pacification is the sacrifice of the entire moral courage of the human mind. A state of things in which a large portion of the most active and inquiring intellects find it advisable to keep the genuine principles and grounds of their convictions within their own breasts, and attempt, in what they address to the public, to fit as much as they can of their own conclusions to

premises which they have internally renounced, cannot send forth the open, fearless characters, and logical consistent intellects who once adorned the thinking world. The sort of men who can be looked for under it, are either mere conformers to common-place, or time-servers for truth, whose arguments on all great subjects are meant for their hearers, and are not those which have convinced themselves.'

Intellectual pacification 聡明智見ノ世界ニテカゝル平和ナルヲ

Moral courage of the human mind 人心徳善ノ剛勇

Active and enquiring intellects 明哲動敏ニシテ事物ヲ考求スルヲ好ム人.—(Idem. p. 64, 65.)

Owing to Mr. Nakamura's great reputation as a scholar, it is well that examples culled from his translations should appear here. But the most casual observer will perceive that the examples taken from Jiyu-no-ri 自由ノ理 are far inferior in point of style to those extracted from Sai-koku Rishi-hen 西國立志編. The passage quoted above can by no means be considered high class translation. It is a paraphrase, with some clauses left out altogether; *e. g.* the clause 'to fit as much as they can of their own conclusions to premises which they have internally renounced,' has nothing in the translation corresponding to it. 'Consistent intellects' is skipped over. Then the translation of open by Seichoku 正直 instead of by Kozen 公然 or Meihaku 明白, and the translation of logical intellects by 'ronri no hito' instead of 'rompō ni tasshitaru seishin' 論法ニ達シタル精神 are indications that the translator has not fully apprehended the meaning of the original. The style of 'Jiyu no ri' is the Yenzetsu style; and the book may be studied to advantage by those who wish to make themselves masters of a mode of speech that will enable them to explain difficult subjects so as to be thoroughly understood by ordinarily intelligent people.

## XV.

'But it is not the minds of heretics that are deteriorated most, by the ban placed on all inquiry which does not end in the orthodox conclusions. The greatest harm done is to those who are not heretics, and whose whole mental development is cramped, and their reason cowed by the fear of heresy. Who can compute what the world loses in the multitude of promising intellects combined with timid characters, who dare not follow

out any bold, vigorous, independent train of thought lest it should land them in something which would admit of being considered irreligious or immoral? Among them we may occasionally see some man of deep conscientiousness and subtle and refined understanding, who spends a life in sophisticating with an intellect which he cannot silence, and exhausts the resources of ingenuity in attempting to reconcile the promptings of his conscience and reason with orthodoxy, which yet he does not, perhaps to the end, succeed in doing. No one can be a great thinker who does not recognize, that as a thinker it is his first duty to follow his intellect to whatever conclusions it may lead. Truth gains more even by the errors of one who, with due study and preparation, thinks for himself, than by the true opinions of those who only hold them because they do not suffer themselves to think.'—(Idem. p. 65, 66.)

Nothing could be poorer than the rendering of the above passage; quite half of the thoughts of the original fail to appear in the translation. This paraphrastic style, which Mr. Nakamura has employed in this work, is altogether inadequate in such a passage as this. I venture to append a translation of my own, which, owing to my limited knowledge of Chinese, cannot be made to read like the original, but which, I venture to think, will convey the meaning of the original in a far more adequate way than is done by the loose translation quoted above.<sup>3</sup>

## XVI.

*Logic is a science rather than an art.*—The distinction between science and art is, that a science is a body of principles and deductions, to explain some object matter: an art is a body of precepts, with practical skill, for the completion of some work.

Logic 論說

Deductions 推開シ來レルモノ

Science 學課

Practical skill 實地ノ熟練

Art 技術

Precepts 要訣

Principles 大本ノ理

—(Thomson's 'Laws of Thought,' English Edition, 1875, p. 9, 10.)

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<sup>3</sup> See end of paper, Ex. XV.



## XVII.

‘ So that the praise of being a good logician, or of having a logical mind, is sometimes awarded when there is little or no acquaintance with the science of logic. An understanding naturally clear and a certain power of imitation, will enable the thinker or speaker to pour forth arguments which might serve for examples of all the logical rules, not one of which he has learnt; and without some share of these talents, no precepts would avail to make a reasoner. But when we write upon logic, the unconscious skill of the artist must be left out of the account, because it cannot be communicated by rules. By the art of logic we mean so much of the art of thinking as is teachable, and no more. The whole of every *science* can be made the subject of teaching.’

A good logician 論說ノ大家

Having a logical mind 論說ノ才氣アリ

Talents 才能

Unconscious skill 其理ヲ知ラザルノ熟練

Power of imitation 模倣ノ

Subject of teaching 教授ノ課目

(Idem p. 13, 14.)

## XVIII

But language, besides being an interpreter of thought, exercises a powerful influence on the thinking process. The logician is bound to notice it in four functions: (I) as it enables him to analyse complex impressions; (II) as it preserves or records the result of the analysis for future use; (III) as it abbreviates thinking by enabling him to substitute a short word for a highly complex notion, and the like; and (IV), as it is a means of communication.’

Functions 功用

Analysis 分析

Complex impressions 萬象ノ繁雜ナルモノ

A highly complex notion 甚ダ繁雜ナル念

Mr. Suzuki's translation of mental science terms differs very much from that of Nishi Shu 西周, who is the great authority on this subject. Nishi's rendering of function is

Kuwan-nō 官能

Analysis, bunkai 分解

Impressions, inshō 印象

Notion, sōnen 總念

Mr. Suzuki uses *Nen* 念 for a notion and also for conception (vide p. 27).—(Idem. p. 23.)

## XIX.

*Genus, Species, Individual.*—In this scale, composed of more or fewer steps, the lowest is always the intention or individual. The next is called the Lowest Species (*infima species*), which can only contain single objects, not subordinate kinds or classes. All the higher rounds of the ladder, except the highest, are called subaltern (*subalterna*) Genera, which are alternately genera and species, genera to the lower, and species to the higher and wider conceptions. The widest class, with which abstraction ceases, is called the Highest (*summum*) Genus, because in this hierarchy of conceptions it is not brought under any other genus as its species but is itself the genus to each conception in the series.—(Idem p. 77.)

Genus 類

Single objects 數個ノ獨体

Species 種

Steps 級役

Individual 個体

Conception 概念

Scale 次序

Abstraction 揀拙力

Nishi Shu translates conception by *Rikai* 理會; Abstraction by *Chiusho* 抽象

## XX.

Doubtful statements may become certain, without any alteration in the facts to which they relate, by changes in our knowledge. A child sees with wonder a lunar eclipse, and thinks that *possibly* another may happen to-morrow; when he has learnt astronomy he may be able to say from exact calculations upon what day one may positively be expected. Yet here the order of things remains the same. The amount of belief which we have in our judgment has been called its modality, as being the mode in which we hold it for truth.

Doubtful statements 不定ノ陳說

Judgment 斷定

Modality 口氣

Benketsu 辨決 for judgment, and

Taiyo 帶樣 Teido 程度 or Yoshiki 樣式 for modality seem to be preferable to the terms employed in the text.—(Idem p. 241.)

## XXI.

Arranging the degrees of modality in an ascending scale, we find that a judgment may be.

(1) Possible, where upon the first view we have no cause to think that the predicate may not be truly said of the subject, but have not examined. Does this amount to a judgment, or is it the step which must precede the formation of the weakest kind of judgment ?

(2) Doubtful, where we have tested it in some cases, and found that some seem to confirm it whilst some are doubtful.

(3) Probable, where all the trials we have made are favourable, but the number of them is not sufficient to warrant certainty.

(4) Morally certain for the thinker himself, where from examination of the matter, or prejudice, or interest, he has formed his own belief, but cannot put forward sufficient grounds for it, so as to control that of others.

(5) Morally certain for a class or school ; where the judgment rests upon grounds which are sufficient for all men of the same habits of thought, or the same education as the thinker.

(6) Morally certain for all, as for example the belief that there is a future state, which though not absolutely demonstrable rests upon such grounds that it ought to influence the conduct (*mores*) of every man.

(7) Physically certain, with a limit ; when the judgment is grounded on an induction supposed to be complete, but with the possibility that future induction may supersede it.

(8) Physically certain without limitation ; as our belief in the law of gravitation, the law of chemical affinity, etc.

(9) Mathematically certain ; when doubt cannot be admitted. *E.g.*, the axiom—two straight lines cannot enclose a space ; or the theorem—the angles at the base of an isosceles triangle are equal.

Ascending scale 層登法

Possible judgment 或然斷定

Grounds 事由

Predicate 屬位

A class 一社交

Subject 主位	A school 一派學徒
Step 階梯	Absolutely 定然
Doubtful judgment 懷疑斷定	To demonstrate 講明
Probable judgment 大約斷定	Induction 歸納
To warrant 保證スル	Law of gravitation 重力ノ理
Prejudice 私見	Chemical affinity 化機性親和力
Interest 利害	

(Idem p. 241-2.)

## XXII.

Now it is an unquestionable fact that those who are equally acquainted with and equally capable of appreciating and enjoying, both, do give a most marked preference to the manner of existence which employs their higher faculties. Few human creatures would consent to be changed into any of the lower animals, for a promise of the fullest allowance of a beast's pleasures; no intelligent human being would consent to be a fool, no instructed person would be an ignoramus, no person of feeling and conscience would be selfish and base, even though they should be persuaded that the fool, the dunce or the rascal is better satisfied with his lot than they are with theirs.—(Mill's Utilitarianism, English 7th Edit. 1879, p. 12.)

Faculty 能力

To be acquainted with 熟知ス

To appreciate 品評ス

Marked preference 較著ノ撰

Unquestionable fact 疑ヲ容ルベカラザルノ事實

Fullest allowance 富資饒給

Person of feeling and conscience 節操知アルノ人

Selfish and base 私曲卑劣ノ

The pure Chinese style of this book is not one that is ordinarily resorted to for translation in this country, it being usually felt, whether rightly or wrongly, that its extreme rigidity and stilted character renders it unsuitable for this purpose.

The author of the work from which we are quoting, however, with his extensive acquaintance with Chinese literature has succeeded in producing a translation, which, despite its freedom, possesses great

merit, and tends to shew the capabilities of the Chinese when used to express the subtleties of advanced philosophic thought. Mill's Utilitarianism has been translated into ordinary Sinico-Japanese by Shibuya Keizo 澁谷啓藏, whose translation of the above passage, as well as of those to be quoted below, I shall insert.

Faculty 靈能

To appreciate 估較享受

Marked preference 最良ノ撰擇

Feeling and conscience 思性良心

Selfish and base 私欲卑下ノ

Mr. Nishi's translation, on the whole, is far more intelligible, as well as being richer and more philosophical in style than that of Shibuya. High class English, such as Mill is in the habit of employing, should be rendered into high class Chinese. In the rendering of even such words as 'marked preference,' 'fullest allowance,' we see at once that Nishi's style approaches the philosophic dignity of the original, whilst that of Shibuya is little above ordinary high class colloquial.<sup>4</sup>

We prefer Reinō 靈能, however, as a rendering of faculty to Nishi's Nōriyoku 能力. The latter term, although employed throughout Nishi's Shinrigaku 心理學, has always struck us as lacking in that distinctiveness which should characterize all such terms. Reinō 靈能 will be found as a rendering of faculty in Bampō seiri 萬法精理.

Nishi's Doku chi 獨知, for conscience, taking all things into consideration, seems preferable to any of the ordinary terms in use, such as Honshin 本心, Riyoshin 良心, Zehi no kokoro 是非ノ心, Dōnen 道念, Chikaku 知覺, Kakugo 覺悟, Hōhen no kokoro 褒貶ノ心, and the like.

### XXIII.

"Capacity for the nobler feelings is in most natures a very tender plant, easily killed, not only by hostile influences, but by mere want of sustenance, and in the majority of young persons it speedily dies away

<sup>4</sup>The reader will please bear in mind that two translations of Mill's 'Utilitarianism' are quoted from. Nishi's translation is placed first in the Chinese printed at the end of the paper: therefore the first of the following lists of terms is culled from his translation and the second from that of Shibuya.

if the occupations to which their position in life has devoted them, and the society into which it has thrown them, are not favourable to keeping that higher capacity in exercise. Men lose their high aspirations as they lose their intellectual tastes, because they have not time or opportunity for indulging them, and they addict themselves to inferior pleasures, not because they deliberately prefer them, but because they are either the only ones to which they have access, or the only ones which they are any longer capable of enjoying. It may be questioned whether any one who has remained equally susceptible to both classes of pleasures, ever knowingly and calmly preferred the lower, though many in all ages have broken down in an ineffectual attempt to combine both."—(Idem p. 15).

*Nishi's Terms.*

Capacity 票質

Nobler feelings 高雅ノ情

Tender plant 嫩芽

High aspirations 志望ノ高大ナル者

Intellectual tastes 靈智上ノ嗜好

To indulge 浸潤スル

Deliberately prefer them 思量シテ之ヲ撰ブ

At the latter end of the passage Nishi's style becomes freer and freer. The words 'equally susceptible to both classes of pleasures' is translated by, 兩種ノ快樂ヲ熟知シテ而シテ均シク之ヲ享ルノ時ニ當リ; 'ever knowingly and calmly preferred the lower' is translated 自ラ其下等ヲ撰ビ恬トシテ以テ意ニ介マサル者蓋シ之アランヤ. The rendering of the last clause by the words of Mencius is misleading, as the choice to be made by Mencius was between the gratification of the appetite afforded by the bears claws on the one hand, and the fish on the other (vide Mencius, Vol. IV: see X. p. 42, Legge's trans. p. 316). Whereas the comparison here is between the gratification of the higher and nobler feelings and the gratification of our animal appetites. In the quotation from Mencius the comparison is between one mode of gratification and another; here it is between the amount of pleasure yielded by the gratification of one set of feelings as set over against that yielded by the gratification of another set of feelings.

*Shibuya's Terms.*

Capacity for the nobler feelings 貴重ナル感覺ニ適スベキ者  
 Tender plant 柔嫩ナル艸木  
 High aspirations 優美ノ熱望  
 Intellectual tastes 心性ノ趣味  
 To indulge 養フ  
 Deliberately prefer them 好ンデ之ヲ撰ブ  
 Calmly preferred the lower pleasures 恬然怪マズ下等ノ快樂ヲ撰取ス.

## XXIV.

‘I must again repeat what the assailants of utilitarianism seldom have the justice to acknowledge, that the happiness which forms the utilitarian standard of what is right in conduct, is not the agent's own happiness, but that of all concerned. As between his own happiness and that of others, utilitarianism requires him to be as strictly impartial as a disinterested and benevolent spectator. In the golden rule of Jesus of Nazareth, we read the complete Spirit of the ethics of utility. To do as we would be done by, and to love one's neighbour as oneself, constitute the ideal perfection of utilitarian morality.’—(Idem. p. 24, 25.)  
 Standard of what is right in conduct 躬行ヲ正フスノ大本  
 Impartial 不偏不倚  
 Disinterested and benevolent spectator 大公仁善ノ傍觀人  
 Golden rule 金典  
 Spirit of the ethics of utility 利家彝倫學ノ精神  
 Morality 道德  
 Ideal perfection 理想上ノ極功

*Shibuya's Terms.*

Standard 定法  
 What is right in conduct 凡舉措ノ當ヲ得ルヲ  
 Agent 主事者  
 Impartial 彼此ニ偏セザルヲ  
 Disinterested and benevolent spectator 公平寛恕ナル傍觀者  
 Golden rule 金言  
 Spirit of the ethics of utility 此教道ノ神髓  
 The ideal perfection of utility 利用道德ノ極功

## XXV.

‘If the impugners of the utilitarian morality represented it to their own minds in this its true character, I know not what recommendation possessed by any other morality they could possibly affirm to be wanting to it: what more beautiful or more exalted developments of human nature any other ethical system can be supposed to foster, or what springs of action, not accessible to the utilitarian, such systems rely on for giving effect to their mandates.’—(Idem. p. 25.)

Impugners of the utilitarian morality 利家ノ道德ヲ攻撃スルノ徒

Real character 眞個ノ品性

Recommendation 嘆美スルニ堪タル者

Development of human nature 人性ノ發達ヲ培養スルヲ

System 模範

Springs of action 制行ノ源

Effect to their mandates 其誠命ノ効アルヲ

Beautiful 美妙ナル

Exalted 高雅ナル

The above translation is in the very best style; the beauty and power of the original is reproduced in the Chinese, and there is not a shade of thought in the original that does not appear in the translation.

Real character 眞性

Development 開達

Springs of action 行爲ノ根基

Mandates 教旨

## XXVI.

“It may not be superfluous to notice a few more of the common misapprehensions of utilitarian ethics, even those which are so obvious and gross that it might appear impossible for any persons of candour and intelligence to fall into them: since persons, even of considerable mental endowments, often give themselves so little trouble to understand the bearings of any opinion against which they entertain a prejudice, and men are in general so little conscious of this voluntary ignorance as



a defect that the vulgarest misunderstanding of ethical doctrines are continually met with in the deliberate writings of persons of the greatest pretensions, both to high principle and to philosophy.—(Idem p. 31.)

*Nishi's Terms.*

Misapprehensions 誤解

Candour 誠信

Intelligence 聰慧

Obvious 昭著

Gross 疎大

Mental endowments 天賦

Entertain a prejudice 偏見ヲ懷ク

Bearings 旨趣

Persons of the greatest pretensions both to high principle and to philosophy 自ラ其大本ニ通シ兼テ哲理ヲ曉ルト稱スル者

Vulgarest misunderstanding 卑俗ノ誤解

*Shibuya's Terms.*

Common misapprehensions 普通ノ誤解

Gross 重大

Obvious 著明

Candour 誠實

Intelligence 聰明

Superfluous 利益ナリトセズ

Persons of considerable mental endowments 天稟俊秀ナル者

Prejudice 偏私

Bearings of an opinion 意見ノ正理

Vulgarest misunderstandings 庸俗ナル誤解

High principle 高尙ノ利

Philosophy 心性ノ學

A large number of Shibuya's technical terms are altogether unreliable. The translation of 'philosophy' by *Shinsei no Gaku* 心性ノ學 is about as misleading as anything could be; *Fu tsū* 普通 is too wide a term as a rendering of 'common'; *Seiri* 正理 for 'bearings' is by no means correct; perhaps *Keiko* 傾向 would suit the meaning even better than Nishi's *Shishiu* 旨趣

We not uncommonly hear 余之ヲ聞ク固ヨリ一曰ニ非ズ

Question 疑義

Purpose in their creation 造化ノ目的

Doctrine 學派

More profoundly religious than any other 深ク教旨ニ合フ此學派ニ  
過グルハ莫カルベシ

*Shibuya's Terms.*

Godless doctrine 蔑神ノ教道

Mere an assumption 粗率ノ臆斷

Moral character of the Deity 上帝ノ道德心性

Purpose in their creation 創造ノ本意

Doctrine 說

More profoundly religious 最モ虔敬ノ深キ

XXVII.

'If it be meant that utilitarianism does not recognize the revealed will of God, the supreme law of Morals, I answer that an utilitarian who believes in the perfect goodness and wisdom of God, necessarily believes that whatever God has thought fit to reveal on the subject of Morals must fulfil the requirements of utility in a supreme degree. But others besides utilitarians have been of opinion that the Christian revelation intended, and is fitted to inform the hearts and minds of mankind with a spirit which should enable them to find for themselves what is right, and incline them to do it when found, rather than to tell them, except in a very general way, what it is: and that we need a doctrine of ethics, carefully followed out, to *interpret* to us the will of God.'—  
(Idem p. 82.)

*Nishi's Terms.*

Revealed will of God 天啓ノ意

Supreme law of Morals 道德上ノ至高ノ理

Perfect goodness and wisdom of God 上帝ノ全善至智

Necessarily believes that whatever God has thought fit to reveal on the  
subject of Morals 上帝ノ道德ヲ啓迪シテ而シテ其至當ヲ得ルヲ  
信ゼザルヲ得ザルナリ

*Note.*—The English of Example VI, owing to an oversight, has not been inserted in its proper place. It will be found in the Appendix alongside the translation of the omitted passage.



Was intended 設立意ニシテ

And is fitted 其直キヲ得ル

The clause commencing *Jinjō setsuwa ni arazaru yori wa* 尋常説話＝非ルヨリハ is very obscure, and there is nothing corresponding to it in the original. If it be intended as a rendering of 'rather than to tell them, except in a very general way, what it is,' it is altogether unintelligible. The whole passage is less perspicuous than Nishi's translations usually are.

*Shibuya's Terms.*

Supreme law of Morals 道德ノ最上律法

Perfect goodness and wisdom 純善純智

Christian Revelation 基督ノ天啓

A doctrine of ethics 倫常教道

This translation is about as obscure as it well could be. Both of the translators seem to have had considerable difficulty in apprehending the meaning of the original. The phrase, 'except in a very general way,' is left out altogether, and one of this translator's sentences is quite unintelligible. I venture to suggest the following as a better rendering of the whole passage.<sup>5</sup>

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<sup>5</sup> Vide end of the Examples, printed in the after part of the paper.

## DISCUSSION.

The Chairman, in thanking the author for his paper, took occasion to express his concurrence in most of the views Mr. Dening had advocated, and he drew attention to the superiority of Sinico-Japanese over pure Japanese as a vehicle of thought and expression.

Various remarks having been made and opinions expressed by the Rev. E. R. Miller, the Rev. G. W. Knox, Dr. Divers, and the Rev. A. D. Gring, and the author of the paper having briefly replied ;

The Chairman, in conclusion, wished to draw the attention of all persons interested in this question to a simple fact which is sometimes in danger of being forgotten. That fact was that the decision concerning the style of language to be used in Japan rests with the Japanese, not with foreigners, and that the decision of the Japanese has made itself heard with no unfaltering sound. In their translations of European books on every subject, Sinico-Japanese is the language used, and it is also, with the modification necessary to colloquial speech, that used by all persons of education in discussing any grave subject. Neither is it that the Japanese have, as it were, wilfully and without a trial of various styles, thus chosen one and rejected the others. In the last century there was an attempt made by a brilliant band of scholars to resuscitate the pure native tongue. This attempt, though it has left some ornamental literature whose charms of style within certain narrow limits delight the student of language, failed utterly as a practical movement. Were it not, therefore, presumption, as well as waste of time, for outsiders to espouse a cause which even the native talent of a Mabuchi and a Motoöri failed to make successful? Should we not, at any rate for the present, learn Japanese as it is, and use for our translations that style which all Japanese workers in every branch have simultaneously adopted? In questions of diction, at least, every nation must be allowed to be its own best judge.

五入

ルヲハ、最モ高度ノ階級ニ逮及センヲ信ス、是已ムヲ得サル所ヨナリ、然リ而シテ利家ノ外尙ホ論者アリテ、基督教ノ託宜ノ正鵠ニ中リ其宜シキヲ得ルハ、即チ人心ヲ訓迪シテ以テ自ラ正道ヲ尋子得ルニ足レル精神ニ附與シ、且ツ其既ニ見ルヲ得タル道ヲ履行スル志ヲ生セシムルヲニアリトナセリ而シテ此託宜ノ目的ハ、正道ノ大綱ニノミ啓示シテ已ムモノナレハ、上帝ノ意旨ノ如何ヲ講明センカ爲メニ、之ニ加フルニ鼻倫ノ學說ヲ組織シテ、謹ンテ之ヲ適用スルヲ最モ樞要タリ

此正理ノ平常觀易キ者ニ非サルヨリハ、帝ニ之ニ告示スルノミナラス、必且之ヲ看破セシ者ヲ牽制シテ之ヲ行ハシメント欲スルニ至レリ故ニ吾儕ノ倫常教道ヲ求ムルヤ亦宜ク其着々注意、務メテ聖意ニ摸倣スル者ニ依ルヘシト、又利用說ハ上帝ヲ無ミスルモノナリト謂フヲ以テ之ヲ排斥スル者ノ意義ハ、若シ利用說ハ天啓ノ意ヲ以テ道德ノ至高ヲ法トナサ、ルモノナリト曰フニアラハ、余ハ之ニ答ヘテ謂ン、上帝ノ純善全智ヲ信スル利家ニ於テハ、道德ノ題目ニ關シテ啓示スルニ、其至當トスル所口ノ如何ヲ論セス、其啓示スル所口必ス利用ノ須要ヲ履踐ス



若シ又謗者ノ言ヲシテ、利用說者ハ、上帝天啓ノ聖意ヲ認

テ天啓ノ聖意トハ、基督ノ說キタル教法ヲ謂フ、道德ノ最上律法

ト爲スヲ肯セストノ意ナラシメハ、余ハ之ニ答テ、上帝ノ

純善純智ヲ信シタル利用說者ハ、亦應ニ上帝ノ道德ノ主

旨ヲ啓示セント考思セラル、者ハ、必非常ニ利用ノ須要

ヲ充ツルノ事ナルヘキヲ信スヘシト曰ハンノミ、然ルニ

利用家ニ非サル諸說者ハ、大率左ノ如キ所見ヲ持シ謂ヘ

ラク、基督ノ天啓ハ元人類ヲシテ自ラ正理ヲ看破セシム

ルノ精神ヲ以テ、其心情腦力ニ開示スルカ爲ニ發シ、苟モ

ハ、最モ虔敬ノ深キ者ト謂フヘキナリ、

譯文

Shibuyas Trans: VOL. I. P. 35

Example XXV11

五五

人又謂、利用學不奉天啓之意、以爲道德上至高之律、余將答而謂、利家信上帝之全善至智者、不得不併信上帝啓、道德而得其至當也、而信其啓、勉誠爲至當、則亦信周利之所要而莫不盡者、是理之必然者也、然而他諸家之說、則以謂、在耶蘇教、天啓云者、其精神布教於世間、使入之心意、自得知何物爲正、旣知之、則又使之欲行者、是設立之意、而得其宜、亦在於斯、故自非尋常說話、則非徒語其爲何物之比也、是以不得無別有彝倫學、縝密叙述之、以使人依解釋、而知上帝之意者也。

斯民之福祉造化之目的、眞在於斯乎、果能眞信如此、則利者  
 非特不爲無神之學派、又深合教旨、可莫過於此學派、

譯者 西崎 宣 二  
 Trans. by Nishi Yōmei VOL. I Part

吾儕ハ利用說ヲ謗リテ、蔑神ノ教道ナリト謂フ者アルヲ  
 聞クヲ、頗ル少シトセス、蓋シ此ノ如キ粗率ノ臆斷ニ對シ  
 テ答辨ヲ下スヲ要ストセハ、宜シク先ツ吾儕ノ上帝ノ道  
 徳心性ヲ觀ルニ如何ナル思想ヲ爲スカヲ論ズヘシ、夫レ  
 上帝ハ已ノ創造物ノ幸福ヲ願ヘルヲ、豈ニ他ノ諸事ニ超  
 へ、而シテ此事ハ其創造ノ本意ナルニ非スヤ、然ラハ則チ利  
 用說ハ啻ニ蔑神ノ教ニ非サルノミナラス、他說ニ比スレ

ヤ、重大著明ニシテ、誠實聰明ノ人ハ固ヨリ之ニ陷ラサル  
 ヘシト雖モ、之ヲ揭記スルモ、亦敢テ無益ナリトセス、其故  
 ハ、凡ソ天稟俊秀ナル者ハ、或ハ偏私ヲ固執シテ、意見ノ正  
 理ヲ解スルヲ務ムルヲ甚タ少ク、又諸民ハ自暴無學ノ欽  
 典タルヲ知ルヲ更ニ甚タ少ク、是ヲ以テ、倫常教道ノ庸俗  
 ナル誤解比々トシテ高尙ノ理心性ノ學ヲ誇稱セル人ノ  
 議論書冊ニ散見スレハナリ

譯文

Trans: by Shibuya VOL.I P.29

今人動則以利學爲無神之學、余聞之固非一日、如此瑣細、  
 偏見固不待辯也、雖然、無已則有說、蓋欲決此疑義、則在吾人  
 觀上帝之道德而爲如何情狀耳、而今若爲上帝所好、莫過於

Trans. by

Zhibin

p. 39.

余請就尋常誤解利家之彝倫學者尙論其一二恐亦非蛇足也。其中至誤謬之昭著疎大者似有聰慧誠信之人不可蹈者。然人雖天賦頗高邁苟於其初少懷偏見往々不努力求通曉於他說之旨趣是自招不智其爲累固不尠。然人能自覺者蓋鮮矣。故至彝倫學之諸派則間雖有負大名而自稱通其大本兼曉哲理者亦不能免此蔽其著迷之中反覆思慮以立論者參以卑俗之誤解也亦不少矣。

Trans. by Nishi

p. 33.

此ニ利用說ニ關スル普通ノ誤解猶數條アリ、其誤謬タル

使之美妙高雅、駕軼此學者、果是何物也、又於其模範而欲其誠命之有效、則不依利家而取制行之源、果何由以立焉、

Trans. by  
H

Nishi Vol. I. P. 333.

若シ利用說ノ道德ヲ謗ル者ナシテ一旦其胸中ニ此說ノ眞性ヲ描出セシムルトギハ識ラス彼等ハ他ノ道德說ノ專有セシ如何ナル名譽ヲ以テ、利用說ノ具スル能ハサル所ノ者ト謂フヤ、道德說ハ人性ノ如何ナル最美最高ノ開達ヲ助クヘシトスルヤ、又他ノ道德說ハ、利用說ノ及フ能ハサル如何ナル行爲ノ根基ニ據リテ、其教旨ニ實力ヲ與

余更有可反覆而論者，是恐攻擊利學之徒，或有不及認識也。曰：所謂福祉在利學爲正躬行之大本者，不在爲行之者一人之福祉，而在爲凡關之者之福祉矣。而於其自己之福祉與他人之福祉之際，則在利學欲使人嚴體不偏不倚，猶大公仁善之傍觀人。余等觀於拿破崙勸人耶蘇之金典，有利家彝倫學之精神，完然寓其中行已如人愛隣如己云者，在利家之道德而爲理想上極功。

Thuns: Py. N. 211  
VOL. I. P. 32

今若使攻擊利家道德之徒有能現此真個品性於其胸懷，則余未知其得能謂在他家道德則殊堪嗟美者，獨有缺於此學否。嗟夫，謂在他家彝倫學，則其摸範之中，有培養人性發達而

ハ、主事者自己ノ幸福ニ非ス、專ラ公衆ノ幸福ヲ指ス者ナリト認メタルノ未ダ全ク正理トナスヘカラサルヲ再論スヘシ、蓋シ主事者自己ノ幸福ト、他人ノ幸福トノ間ニ就テハ、利用説ハ、公平寛恕ナル傍觀者ノ如ク、嚴ニ其彼此ニ偏セザランヲ要シ、又吾等ハ曾テナザレノ耶蘇ノ金言中ニ於テ、此教道ノ神髓ヲ讀ミシニ、其所謂己ノ人ニ施スコハ宜シク人ノ己レニ施サンヲ欲スル者ヲ以テスヘク、我カ隣人ヲ愛スルハ、宜シク我ヲ愛スルカ如クスヘシト、即チ利用道德ノ極功ニ言フ者ナリト



リ、而シテ其自ラ賤劣ノ快樂ニ耽ル所以ノ者ハ、則チ好テ  
 之ヲ挑ムニ非ス、不幸ニシテ其接近スヘキ者、及ヒ享受ニ  
 適スヘキ者、唯此快樂アルニ止マレハナリ、故ニ從來諸人  
 兩種ノ快樂ヲ兼有セントスル無効ノ試爲ニ於テ失敗セ  
 シ者ハ、多ク其例アリト雖モ、苟モ齊シク兩種ノ快樂ヲ識  
 得スルノ人ニシテ、曾テ恬然怪マス、下等ノ快樂ヲ撰取ス  
 ル者アリト謂フハ、豈疑フベキノ說ニ非スヤ

譯文

Sullivan's Trans:

of the above passage

余ハ此ニ至リ、前ニ利用說ヲ攻撃セシ諸人ノ言ニ、凡ソ舉  
 措ノ當ヲ得ルヲニ關シテ利用ノ定法トナスベキ幸福ト

熟知兩種之快樂、而當堪均享之時、自撰其下等恬不以介於意者、蓋有之哉、其多欲兼魚與熊掌、而遂自取敗者、則有之

三

Trans. by Mizu Shu Vol. I. P. 19, 20

顧フニ世ノ貴重ナル感覺ニ適スヘキ者ハ、殆ント柔嫩ナル艸木ノ、啗ニ傷殘ノ害ノミナラズ、培養ノ欠乏ニ因ルモ、亦容易ニ枯死スルカ如ク、少壯ノ人多クハ其生活ノ地位ニ從テ、自ラ歸向スヘキ業務ト、交際スヘキ社會トノ、此感覺ヲ養成スルニ便ナラサル者アルニ因リ、速ニ壞滅ヲ被ルコアリ、夫レ諸人ノ心性ノ趣味ヲ失ヒ、隨テ又優美ノ熱望ヲ失フ所以ノ者ハ復之ヲ養フノ時機ヲ有セサルニ因

セス、而シテ縱令之ニ説クニ愚矇魯鈍詐惡ノ輩、却テ彼等  
ニ勝リタル足意アルヲ以テスルモ、亦之ヲ欲セサルベシ

譯 文

Shibuyas Trans. Vol. I, p. 13, 14

且夫雖稟質有高雅之情者、其爲性大率如嫩芽、易枯死、是不  
特攻之寇、衆於外、又資之需、乏乎內也、況使其稟質高者、得伸  
其力、而無間斷者在於立生計之職業、與爲往來之交、友兩者  
內外相依、以助之乎、苟不然、則方年少之時、不瀆凋萎者幾希、  
夫人亡、靈智上嗜好、則從而亡、其志望之高大者、是不能得時  
與機會、而浸潤之也、其竟至下等娛樂、惟耽也、是非思量而選  
之、一則其可得享者、止是耳、一則猶堪享者、止是耳、自古人能

其爲痴愚、爲頑鈍、爲狡猾之爲勝於其運命、亦必不從也

四 四

Pauses, by Nishi Shin

利川論

Ryoyon New edition pub: 1877 Vol.1 P.15,16.

兩個ノ快樂ニ於テ、彼此ヲ論セス、齊シク之ヲ熟知シ、及ヒ  
齊ク之ヲ估較享受スヘキノ人ハ、其高等ノ靈能ヲ用ヒタ  
ル生存ノ模様ニ於テ、最良ノ撰擇ヲ爲スヲ固ヨリ論ヲ待  
タス、是ヲ以テ人類タル者ハ、獸畜快樂ノ最多ヲ許スノ約  
ヲ爲スモ、變シテ賤陋ノ動物ト爲ルヲ欲スルヲナク、又才  
智アル者ハ、愚人ト爲ルヲ欲セス、教育アル者ハ、無學ト爲  
ルヲ欲セス、思性良心アル者ハ、私欲卑下ノ人ト爲ルヲ欲

ノ線ハ、空間ニ周匝スルコト能ハズト云ヒ、或ハ二等邊、三角  
 形ノ底ニアル角度ハ互ニ相等シト云ヘルセオンム  
 家ノノ如キ皆是レナリ  
 所謂ノノ如キ皆是レナリ

Thesis: 1. 2. 3. 4. 5. 6. 7. 8. 9. 10.

理算

夫人之能力極高、故用之之道亦區而別、然今當準上之例、規  
 而判其生存之道、有均熟知品評、而快樂、而均享之者、而歸其  
 一以較著之撰、則是爲不可容疑之事實、凡稟人之生者、雖爲  
 享獸之快樂、而許之以富資饒給、甘以獸自居者、未之有、故知  
 者、未曾甘爲愚、有教育者、未曾甘爲無智、有節操獨智之人、未  
 曾甘爲私曲卑劣之人、縱雖說之曰、與守其平素之辛苦、不若

狀ニ影響スルニ足レルモノヲ謂フナリ、

第七 物理上ニ於テ有限確實ノ斷定、是レハ姑ク完全ナリト定ムル歸納ニ原本スルモノニシテ、後來更ニ完全ナル歸納ノ爲メニ廢止セラル、モ亦料ルベカラサルノ斷定ニ屬セリ、

第八 物理上ニ於テ無限確實ノ斷定、是レハ重力ノ理化、機性、親和力ノ理ナド、我輩ノ最モ厚ク信シテ疑ハサルモノヲ謂フナリ、

#### 四三

第九 數理上ニ於テ確實ナル斷定、是レハ毫髮モ疑ヒシ容ルヘカラサルノ事理ヲ謂フナリ、例ヘバ、眞直ナル二個

リハ、自ラ其信ヲ立テタリト雖、之レガ爲メニ完全ナル  
 事由ヲ陳述シテ、他人ノ信ヲ取ルニ足ラサルモノニ係レ  
 リ、

第五 人道<sup>ニ</sup>於<sup>テ</sup>一社交<sup>ハ</sup>一<sup>ハ</sup>派學徒<sup>ノ</sup>爲<sup>メ</sup>ニ確實  
 ナル斷定<sup>、</sup>是<sup>レ</sup>ハ思想者自己ト、思想ノ習慣ヲ同シクシ、或  
 ハ教育ヲ同クスル諸人ノ爲<sup>メ</sup>ニハ完全ナル根據ヲ有ス  
 ル斷定ヲ謂フナリ、

第六 人道<sup>ニ</sup>於<sup>テ</sup>衆庶<sup>ノ</sup>爲<sup>メ</sup>ニ確實ナル斷定<sup>、</sup>是<sup>レ</sup>ハ  
 假ヘハ、人ノ死後ニ未來ノ世界アルノ信ノ如ク定然トコ  
 レヲ講明スルコトヲ得サレトモ、其根タル勿論各人ノ行

ベキモノナリヤ、將タ斷定ニ構成スルノ楷梯タルニ過キザルモノナリヤ、未タ知ルベカラサルナリ

第二 懷疑斷定、是レハ二三ノ事物ニ證徴シテ、甲ノ實跡ニ從ヘバ、其真ナルヲ證スルニ足ルト雖モ、乙ノ實跡ニ從ヘバ、不定ニ属スル者ナリ

第三 大約斷定、是レハ試験ヲ行ヒタル所ニ於テハ、相矛盾スルヲナケレドモ、其ノ試験ノ數タル、尙ホ僅々ニシテ、十分ニ其確實ナルヲ保證スルニ足ラサル者ナリ

第四 人道上ニ於テハ思想者自己ノ爲メニ確實ナル斷定、是ハ其事實ヲ攻察シタル上、或ハ私見上、或ハ利害上ヨ



必ズシモ其ノ事ノ果シテ然ルヲ保證スルノミニアラズ  
 往々疑貳ノ間ニ居ル者アルナリ、其次第ヲ名ケテ斷定上  
 ノ口氣ト爲ス、他無シ、其ノ實理タルヲ保スルノ輕重ノ口  
 氣ナルニ因ル

Thence  
 P. 500.

斷定上ノ輕重ヲ層登法ヲ以テ排列スルキハ、左ノ如クナ  
 ルベシ

第一 或然斷定<sup>レハ</sup>是<sup>レハ</sup>初思ノ時ニ於テハ、其ノ主位ト屬  
 位トノ關係ハ、或ハ然ラント覺ユレモ、未ダ考察ヲ經ザル  
 者ニ屬ス、故ニ是クノ如キハ、眞ノ所謂斷定ノ位ニ上ボス

トナリテ、種ノ列ニ加ハル能ハス、常ニ概念中ニ在テ、類ノ極位ヲ占有シテ、種ノ位ニ下ラサル者ナリ

Trans.

P. 156410.

其ノ事實上ニ變化ナクシテ、吾輩ノ知識上ニノミ變アル所謂不定ノ陳說ハ、曾テ其確定タルヲ妨ゲズトス、例ヘバ人幼稚ナル時ニハ月蝕ヲ見テ驚訝シ、明日モ或ハ他ノ月蝕アル可シト思想セシニ、天文学ヲ研窮シタル後ニハ、精密ナル算計上ヨリシテ、何日ニ月蝕ノ有ル可キヲ推歩スルコトヲ得ベシ、然レモ、自然ノ順序ハ當時モ目今モ、敢テ變ハル所ロアルニアラズ、凡ソ吾輩ノ毎ニ斷定ヲ下スヤ

アラス、而シテ個體ノ直上ニ位スル者ヲ、最下ノ種ト云ヒ  
是レニハ内々數個ノ獨體ヲ包含スレハ、別ニ小類、或ハ小  
部ト云フモノヲ包含スルニ至テハ、要スルニ、此等ノ級段  
ノ中ニ於テ、最上層ニ位スル者ト、最下層ニ位スル者トヲ  
除クノ外ハ、凡テ中層類ト曰フ、蓋シ下層ニ對スレハ、類ト  
成リ、又上層ノ廣大ナル概念ニ對スレハ、種ト成リ、常ニ交  
互類種ヲ離レサル者ナリ、又最大ナル部類ニシテ、彼ノ揀  
抽力ノ運用コ、ニ止マリ

復タ上ラサル者ハ、此レヲ最上層ノ類ト曰フ、蓋シ、概念ノ  
領域中ニ於テ、是ノ最上層ノ類ハ、他ノ類ノ、附離スル所ロ

ルヲ得セシム

第二其分析セルモノヲ登記シテ將來ノ用ニ供スルヲ得セシム

第三簡短ナル一語ヲ常ニ能ク甚ダ繁雜ナル念ニ加ヘテ自他思想ノ運用ヲ省畧スルヲ得セシム

第四人々ヲシテ互ニ思想ヲ通スルノ便利ヲ得セシム

Trans:  
P. 49.

類種并ニ個体ヲ論ス

類種個体ト次序ヲ成ス、中ニ類ト種トハ自ラ層級段アリト雖モ個体ニ至テハ、最下層ニ属シ、此レヨリ小ナルモノ

ノ技術家ニシテ自ラ其理ヲ知ラザルノ熟練ハ、固ヨリ規則ヲ以テ傳授シ難キニヨリ、措テ論セズ、余ガ主旨トスル所ロハ、思想ノ術ニ就テ、其教授スベキモノヲ謂フノミニシテ他事ニ涉ラズ、蓋シ、我カ知テ教授スベキモノハ、皆之ヲ教授ノ科目ニ収メテ可ナレハナリ

Thus:  
p. 24, 25

Example XVIII

言語ハ既ニ思想ノ通辨者ニシテ、殊ニ思想ノ運用ニ就キ裨益ヲ爲ス鮮淺ナラズ故ニ、論說學者ハ、言語ノ功用ヲ分ナテ、宜ク左ノ四様トナスベシ

第一能ク心内ニ映射スル萬象ノ繁雜ナルモノヲ分析ス

成スモノ即チ之ヲ一技術トス

鈴木 唯一  
Trans. by Suzuki Teichichi (called  
足利之辻  
Suzuki no hojisi edition pub. 1879.  
p. 17, 18.

Example XVII

論說學ニ於テモ、世人聊カ其學ヲ知ズシテ、或ハ論說ノ大  
家タル名譽ヲ博シ、或ハ論說ノ才氣アリト稱揚セラル、  
コトアリ、蓋シ思想者、若クハ辨論者、生來銳敏ニシテ且ツ  
幾分カ摸倣ノ能アラハ、論說學ノ規則ハ一モ之ヲ知ラザ  
ルモ、確論ヲ立テ、却テ之ヲ其例規トスルヲ得ヘク、若  
シ此才能ナクンバ、假令規則ヲ示シ要訣ヲ授クルモ、議論  
者タルヲ得ベカラズ、而シテ余ノ論說書ヲ著述スルモ、彼

ル所ノ末短ニ至ルマデ、之ニ聽從スルヲ其最モ主長ナル義務ナリトナサブルヲアルヲナシ、然リ而シテ眞理ノ利益ハ思想スルノ煩錯ヲ免レテ、眞實ナル意見ヲ抱カン者ヨリモ、寧ロ勉焉書ヲ讀ミ、學識ヲ以テ其精神ヲ練磨セル者ノ偶タマ謬誤アラシニハ如カザルナリ

Trans: by The Author of The Paper

論說ハ、技術ヨリモ寧ロ學課ニ近シ、蓋シ、學課ト技術トノ差別ハ他ニ非ス、大本ノ理并ビニ之ヨリ推開シ來レル者ヲ彙集シテ以テ、何事カ一項ヲ講明スルモノ即チ之ヲ一學課トシ要訣ヲ彙集シ實地ノ熟練ヲ兼テ何事カ一業ヲ

憤發且ツ獨立スル精神ヲ以テ思想ノ聯絡ヲ害ハズシテ  
其結局ニ至ルマテ進歩スルニ足ルノ勇氣ヲ有セズ、遂ニ  
些モ世ニ利益ナキ者ノ衆多ナルハ、勝テ計フベカラス、又  
小膽ナルモノ、中ニ時トシテ自ラ能ク其良心ヲ尊重シ  
聰明銳敏ナル靈智ヲ有スルモノアリテ、一生涯禁制シ得  
ザルノ智能ノ爲メニ、純粹ナラザル論理ヲ組織シ、且ツ其  
良心ト理性トノ振興スル所ノ諸說ヲ以テ、正說ト稱セ  
ラル、所ノ口ノ說ニ和セシメンカ爲メニ、其有スル所ノ口ノ  
企謀ヲ用ヒ盡スト雖モ、遂ニ之ヲ成就セサルモノ之アリ  
然ルニ高大ナル熟考者ハ皆其精神ニ導ヒカレテ、結局ス



セ、ソノ向フトコロニ任セテ、思想スル自由ノ權アルベキ  
ヲナリ

Trans: p.24.25

抑モ世ニ正説ト稱セラレタルモノ、斷言ニ由テ以テ結  
末セサル所ロノ推究ヲ詬諄咎責スルハ啻ニ邪説者ノ精  
神ヲシテ衰弱セシムルモノナル<sup>ニ</sup>ミナラス、邪説ヲ信セ  
サル者モ亦之ニ由テ最モ損害ヲ受クルヲアリ乃チ異教  
者ノ名ヲ受クルヲ懼レテ其精神ノ開發盡ク萎靡シ、其理  
性ニ臆病ノ起ルヲアルノ類是ナリ拔群ノ智力ト小膽ナ  
ル性質トヲ兼有スル者衆多アリ此ノ如キ者ハ宗教ニ背  
キ義ニ返スル輩ト同視セラレンヲヲ懼レテ、侃々トシテ

モイフ、思想者ノ大家ハ、ソノ才智ノ至ルトコロニ從ヒ何  
レノ方ニナリトモコンニ導ビカレ、ソノ歸結スルトコロ  
ニ任スルヲナリ、コレヲ以テ第一ノ職分ト爲セリ蓋シ人  
或ハ預ジメ學習シ、自ラ思想シテ謬見ニ入ルモノアリ或  
ハ自ラ思想セスシテ、タゞ眞說ヲ執ルモノアリ、然レドモ  
眞理ハ思想シタル謬見ヨリ顯ハル、ヲ多ク、思想セサル  
眞說ヨリ顯ハル、ヲ少ナシ、思想ノ事ハ、コレマデハ思想  
スベクコレヨリ先ハ思想スベカラズトイフ限界アルベ  
カラス、マダコノ事理ハ思想スベク、コノ事理ハ、思想スヘ  
カラストイフ禁制アルベカラス人々其至ルトコロニ任

ハレンヲ恐懼スルガ故ニ發出スベキ才智モコレガ爲  
メニ萎靡シ考へ出スベキ道理モ生セサルコトナリ蓋シ  
聰明靈慧ノ人ハ世上ニ數多アレモソノ能ク奮ツテ考思  
ノ事ヲ爲シ強猛ニ一己ノ所見ヲ言フヲ敢テスルモノ  
甚ダ少シコレ他ナシ世上一般ノ說ニ異ナルトキハ、或ハ  
イルレリザアス〔教法ニ背ク〕トイハレ、イムモ―ラル〔正經  
ニ非ス〕ト詆ラル、コトユエ、誰モ懼レテ自ラ臆病ニナル  
ナリ、試ニ思へ、カ、ル風習ニ由リテ世間ニ賢智ノ人ノ生  
スルヲ妨ゲタルヲ、幾何ゾセ、勝ゲテ筭ヘガタカルベシ  
思想ヲ嗜ムモノハ理學者ナレバ理學者ノヲ思想者ト

ムルヲ、此ノ如キ情勢ニテハ昔シ世界ヲ飾リシ正直ニシ  
テ畏懼セザル理論ノ人ノ如キモノヲ、生シ出ダスヲ能ハ  
ザルベシ、

世上ニテ眞理ナリトスル所ロノモノヲ、已レモ亦眞理ナ  
リト認メ、時俗ノ説ニ從フ人ハ、其議論タゞ之ヲ聞ク人ノ  
心ニ合フヤウニスルマデニテ、自己ノ心ニ、コレハ確實ナ  
リト證スルモノニハ非ス、

Trans. D. K. H.  
1923.

カクノ如キ有様ニテハ異端邪説ニアラザル人ハ、更ニ甚  
シキ損害ヲ受ルヲナリ、何ニトナレバ、世上ヨリ異端ト言

ニモセヨ、平民ニモセヨ、己<sup>レ</sup>ニ異ナル意見ヲ聞クコトヲ嫌  
フハ、己<sup>レ</sup>ガ意見ヲ眞確ナリト擅マ、ニ自ラ定ムルナリ  
凡ソ異說ヲ禁ズルハ己<sup>レ</sup>ガ說ヲ謬誤ナキモノト思ヒ自  
ラ固ク信ズルナリ、

中 考 正 誤  
Zakumura Masumaro's Trans: Gakko Ji-ju no Ri  
1st edition pub: 1871. B-K II. P.3

然<sup>レ</sup>モ聰明智見ノ世界ニテ、カ、ル平和ナルコトハ人心  
徳善ノ剛勇ヲ賣リテ買ヒ得タル平和ナレハ、善キコトニ  
非ズ、何トナレバ、明哲勤敏ニシテ事物ヲ考求スルヲ好ム  
人、大底ハ其實ニ知り實ニ思フ所ノ道理ヲ胸中ニ隱シ蓄  
ヘ、成ルタケ、世間一統ノ論ニ合フヤフニト發言スルヲ務

ヲ得ヘカラス、故ニ若シ之ヲ人視スルニ至テハ、轉タ吾人  
ハ、正教ヲ奉スルノ人民ニアラサルノ疑念ヲ生スルヲ免  
レサルヘシ、

Transl. B-K XV.  
P. 89.

今意見議論ノ新タニ出ルモノアリテ、權勢ヲ以テコレヲ  
壓抑スルヲアラシメ、若シソノ壓抑セラル、トコロノ  
說眞確ナレバ、コレヲ壓抑スル人ハ眞確ノ說ヲ非ナリト  
シ自ラ謬見ニ入ルナリ、畢竟權勢アル人ト雖モ、天下ノ人  
ノ疑案ヲ定斷スル權勢ハアラサルベク、又人々ヲシテ各  
自ラ判斷スルヲ禁スル權勢ハアラザルベシ、蓋シ官府

騰貴スルヲ奈何セン、

亞弗利加人ヲ見ヨ、全身漆黑ニシテ其鼻扁兮タリ、此ノ如キ醜體ノ動物ハ、蓋シ憫憐スルニ足ラサルナリ、

上帝ハ、全智ナリ、全智ニシテ豈ニ良魂ヲ此黑醜ナル肢體ニ賦與スルノ理アラシヤ、

容色ノ研醜ノ、以テ人性ノ優劣ヲ判別スルノ基本タルヤ、蓋シ自然ノ理タリ、亞細亞人ハ閹豎ヲ使役スルニ因テ、常ニ黑人ヲシテ、自餘ノ人民ト混同セシメス、是其之レヲ賤視スルハ、更ニ我カ歐人ヨリ甚シキモノアリ、

何等ノ見點ヨリ觀察ヲ下スモ、此動物ヲ人視スルノ理由

ノ罪ト看做スモ、固ヨリ其理著明ナルモノナリ、英國ノ如  
 キハ預シメ此狂氣ノ發作ヲ罰セサレハ自殺ノ罪ヲ罰シ  
 能ハサルハシ

Think, p. 5

予ニ黑人ヲ奴隸トスルノ權利アルト主張セシメン乎、  
 其論趣ハ左ノ如クニ過キサルヘシ

歐人ハ己ニ米洲ノ人種ヲ芟リ盡シタリ故ニ今米洲ノ大  
 陸ヲ修理センガ爲メニハ、必ズ亞弗利加人ヲ驅テ奴隸ト  
 爲サ、ルヲ得ズ

自主民ヲシテ、甘蔗ヲ耕種セシメン乎、然ラハ糖價ノ大ニ



主ノ民ト爲リテ、人生必要ノ心思ヲ使用スルニ比スレハ  
 稍、其苦痛ヲ忍ビ得ヘキナリ

Thinks: p.6

史傳ヲ讀テ羅馬人ニ曾テ一定ノ因由ナクシテ自殺セル  
 者アルヲ見サルヘシ、然ルニ英人ハ毫モ其謂レナキノミ  
 ナスス、福澤ニ沐浴スル身ヲ以テ尙ホ往々之ヲ犯スヲ免  
 レス、抑モ羅馬人ニ此惡癖ナキハ、教育ノ效驗ニシテ、其主  
 義ト慣習トヲ以テ補助シ、英人ニ在テハ一種ノ病患ニ屬  
 シテ、全ク其運営ノ常ナラサルノ然ラシムル者ニシテ、他  
 ニ原因ト云ヘキモノハアラサルナリ

夫然リ然ルヲ以テ一定ノ國土ニ於テノ自殺ヲ以テ醜汚

Example X

敢テ其常ヲ變セサリシガ伊國ニ於テハ愉快ノ極、殆ト狂者ニ類スルモノアリ、斯ク二國ノ人情ノ同シカラザルヤ思議ノ外ニ在リ

Third Part

暖地ハ、炎熱甚タ熾ニシテ肢體ノ氣力ヲ奪取スルニ足レリ、肢體ノ氣力、一タヒ疲弱スルキハ忽チ心思ニ波及シテ、其作用ヲ遲鈍ニスヘシ然ルヲ以テ、暖地ノ人ハ奇事異聞ヲ求メス事業ヲ企圖セス、精神萎靡シテ、自奮ノ志ヲ發スルヲ能ハス、其心事、啻ニ安逸無事ヲ以テ唯一ノ康福ト爲シ意思ヲ勞動スルヲ以テ至酷ノ刑罰ト思フノミ故ニ寧ロ奴隸ノ苦界ニ沈淪シテ其筋骨ヲ勞スルアルモ、却テ自

シ、專制政ハ畏懼ヲ以テスルナリ

Thema: 1-1

寒國ノ人民ハ、游樂ニ誘掖セラル、<sup>7</sup>、極メテ鮮少ナルモ、  
 暖國ノ人民ハ一層ソノ濃厚ナルヲ覺フ、又熱國ニ至テハ  
 其勢焰々トシテ抑制ス可カラサルモノアリ、游樂ヲ好ム  
 ノ深淺ヲ視テ、以テ其風土ノ寒暖ヲ知り得ヘキハ猶ホ緯  
 度ノ高低ニ依テ南北ノ距離ヲ測定ス可キガ如シ予曾テ  
 英伊ノ二國ニ遊テ其劇場ニ赴キシニ同一ノ俳優ニシテ  
 同一ノ音樂ヲ用ヒタレ<sup>15</sup>、觀客ノ心情ヲ感動セシ度数ニ  
 至テハ、大ニ深淺ノ差アリ英國ニ於テハ、觀客恬然トシテ

可應之  
Trause Br. (ia Reich)

方法精理  
(allied - Panposet) p.2

Example VIII

人其初生ノ時先ツ心意ニ銘記スルモノヲ教育ノ法ト謂  
フ人此法ニ頼テ以テ人生ノ倫常ヲ履踐スルノ階梯ト爲  
ス故ニ各個小家ハ宜シク之ヲ統括スル所ノ大族即チ一  
國ノ教育法ニ率由シ脩治ス可キヲ要ス

二一  
夫レ人ハ各一個ノ主義ヲ具スルモノナレハソノ之ヲ集  
成スル所ノ政府モ亦一個ノ主義ナカルヘカラズ是レ教  
育ノ法ハ政体相異ナルニ從テ其旨趣ヲ殊ニスル所以ニ  
シテ立君政ハ名譽ヲ以テ目的ト爲シ、共和政ハ徳ヲ以テ

リ、禽獸ハ禽獸ノ法アリ、或人ノ論ニ曰ク、吾人仰テ視、俯シ  
 テ察スルニ、覆載間萬有ノ効果アル皆ナ造化無心ノ氣數  
 ニ出デザルハナシト、嗚呼妄誕ナル哉、造化果シテ無心ナ  
 ラハ夫レ將タ何ニ由リテ、此靈覺アル生物ヲ造ラン、豈無  
 心ヲ以テ有識ヲ生スルノ理アラシヤ、爰ニ理ノ元行タル  
 モノアリ、此理ト諸物トノ間ニ關涉ノ存スルアリ、諸物ノ  
 中互ニ彼此ノ關涉アリ、是レ即法ナリ、  
 上帝ト天地萬物トノ關涉ニ就テ云ヘバ、上帝ハ其造化主  
 ト爲リ、其保護主ト爲ル、其初メ萬物ヲ創造セシ處ノ法ハ  
 其後之ヲ保護スル處ノ法ナリ

ケ第三ヲ形體ノ因ト名ケ第四ヲ最後ノ因ト名クルナリ  
 ト、此分類ハ一般ニ士歌羅斯<sup>ス</sup>坿<sup>コ</sup>加<sup>ラ</sup>派<sup>ハ</sup>ノ諸哲之ヲ誦法シ又  
 今猶僅カニ之ヲ奉スル徒アリ、余ハ更ニ此中ニア實力最  
 後ノ二因緣ニ就テ之ヲ論スヘシ

Trans p. 492

法トハ其廣義ニ就テ之ヲ云フキハ、事物ノ天然ニ出テ須  
 臾、モ離ル可ラサル處ノ關涉ナリ○其義然ルヲ以テ、兩間  
 萬物、々トシテ其法ヲ有セサルナシ故ニ神明ハ神明ノ法  
 アリ、<sup>ブルタル</sup>キ曰法ハ諸<sup>神及諸人ノ君主ナリ</sup>物体ハ物体ノ法アリ、人ニ勝レタル靈  
 覺者ハ、人ニ勝レタル靈覺者ノ法アリ、人類ハ人類ノ法ア

因緣觀ノ說ノ記傳ハ、諸家ノ考定異論百出固ヨリ一定ノ  
 說ナシ、今茲ニ舉示スル所ハ其梗概ヲ示スニ過ギサルノ  
 ミ、此因緣觀ノ區別分類ノ最古ナルハ亞立斯度德アリストテレスヲ鼻祖  
 トシ次ノ分解ヲ立テタリ、曰、總テ諸作物ノ全備ニ至リタ  
 ル者ハ、四者ヲ其中ニ含メリ其由テ以テ成ル所ノ作者其  
 資テ以テ成ル所ノ材質原行其依テ以テ形狀樣法ヲ定ム  
 ル所ノ圖畧觀念其爲ニスル所ノ最後目的ナリ、是ヲ以テ、  
 今一ノ彫像ヲ造ラムトセハ彫工花蕊石塊彫工心裏ノ意  
 匠此作物ヲ造ル爲ノ初念トハ是ナキヲ得サルナリ此中  
 ニテ第一ナル者ヲ實力ノ因ト名ケ第二ヲ材質ノ因ト名

## Example VI

History of the Doctrine—Aristotles View—The history of the doctrine of causality presents a number of widely different theories, a brief outline of which is all that we can here give. The most-ancient division and classification of causes is that of Aristotle, which is based on the following analysis: Every work brought to completion implies four things: an agent by whom it is done, an element or material of which it is wrought, a plan or idea according to which it is fashioned, and an end for which it is produced. Thus, to the production of a statue there must be a statuary, a block of marble, a plan in the mind of the artist, and a motive for the execution of the work. The first of these is termed the efficient cause, the second the material cause, the third the formal, and the fourth the final cause. The classification was universally adopted by the scholastic philosophers, and to some extent, is still prevalent, we still speak of efficient and of final causes.

Haven's mental philosophy

Trans p.493

note

As the English of this example has been omitted from the earlier part of the paper we insert it here





一ハ、他ノ一ト並立スルコトヲ拒ムノ能力ヲ有シ得、又多  
分ハ、實ニ其力ヲ有スト雖モ、亦同一トスルヲ得ヘシ

Trans. 1, 474

ャトナク、之ヲ別々ニ看ル時ハ、總テ其異物タルヲ、認ムル  
 コト、能ハザル如キニ至ラム、然レモ此兩個、同一ニ非スシ  
 テ、此假設ニテモ、二個ノ別々ナル圓球トシ、二個ノ本體ト  
 シ、二個ノ實體トス、今は兩ナカラ同一タリト云フハ、二物  
 唯一ナリト云フニテ、類似ハ同一ニ非ルナリ、是大宗牧  
 師フザイトリ吼多來氏ノ能ク指示セルカ如ク、類似ハ同一ト別ナル  
 ノミナラズ同一ニ、必須ナル關係ヲモ、有セサルナリ、今マ  
 人アリ、其形容、長短、大小、等ノ如キ、其以前ヨリ、全ク同シカ  
 ラサル變化ヲ受ク、然モ之ヲ同一人ナリト、謂フヲ得ベシ、  
 今二個ノ觀念同一ナルアリ、是全ク別ナルノミナラス、其

Example V.

我カ己ノ意識ニモ差アリヤヲ疑フハ、我カ存在ヲ疑フニ  
 テ我カ疑フト云フコトヲ知ルノ證據ハ唯、意識アルヲ以  
 テ知レハ、此意識、自ラ疑フコトナルヲヤ、

Trans: p.10

Example VI

同一ハ、類似ニハ非ス、唯其相似メルノ指スニ非ス、故ニ相  
 似<sup>○</sup>ブル物ハ同<sup>○</sup>シ物ニハ非ズ、今假設シテ、兩個ノ圓球、若ク  
 ハ圓體アリトシ、其狀何レニ就テモ密ニ一樣ニシテ大小  
 モ色澤モ形狀モ、同シク以テ製シタル材料モ、又化學上ノ  
 混合實質モ悉ク同一ニテ目ニ見ユル所モ手ニ觸ル、所  
 モ他ノ官能ニ、感スル所モ、同シク其形容形質一モ異ナル

## 一二

全ナラストモ均シク吾人ノ力ニ及フヘクシテ、均シク觀察ト彙類ト學問上ノ論述ニ供スヘキコト的然タリ、且今ソレ動物ト植物トニ於ケルハ猶其習慣ヲ視察スルコトヲ得、何如ソ特リ人ニ至リテ其習慣ヲ視テ其思惟、情欲ノ現象ヲ察スヘカラサルコト、アリト謂ハムヤ、故ニ彼ノ一科ニ於テ觀察セル事實ヲ取り仔細ニ普通ノ真理ニ歸納シテ、其學ノ基礎方法ヲ立ツルコトヲ得ハ、此一科ニ於テモ、亦然ラザルヲ得サルナリ、

今萬有ノ現象、其諸種ノ形狀、生體、非生體等ノ變化ヲ觀察  
 シ之ヲ彙類シテ、以テ萬有ノ依テ立ツ所ノ理法ヲ考定ス  
 ルコトヲ得、此ノ如クニシテ植物ノ學、動物ノ學、地球ヲ合  
 成スル元行ノ學、地下ニ位置スル地層ノ學、又此地球上、若  
 クハ地球外ニ於テ或ハ近ク、或ハ遠ク働キ、造々化々ノ變  
 化ヲ生セシムル、諸種ノ靜力ト、動力トノ學ヲ造立スルコ  
 トヲ得、加旃、吾人ノ棲ル行星ヲ離レテスラ、仔細ニ天上  
 ノ諸體ヲ觀察シテ、其位置、運行、距離ヲ知り、其大小、麁密ヲ  
 計リ其遲速ヲ測リ、以テ諸星ノ學ヲ創立スルコトヲ得ル  
 時ハ吾人已ノ意識ヨリ呈スル、我カ心意ノ現象ハ縱ヒ十

民ノ自立ヲ壓壞スルモノハコレヲ霸政  
又曰虐政ト云ベキナ  
リ

西國文藝叢書  
Zai koku ris shi hen p.123

1st edition pub: 1876.

抑モ休母<sup>ヒユーム</sup>多年ノ間、國政民事ヲ料理シ、屢々獨見<sup>ト</sup>以テ衆  
論ニ抗シ、タトヒ誹笑セララル、トモ、更ニソノ心ヲ動サズ、  
ソノ志ヲ屈セズシテ、後ツヒニソノ說ノ世ニ行ル、ヲ生  
前ニ見ルヲ得タリ、是ソノ忍耐ノ德、實ニ偉類スクナキ  
モノト云ベシ、

Trans:

ノ事ヲ爲シ、イカホド力ヲ竭ストモ、サラニソノ益アルベカラズ、譬ヘバ玻璃鏡ニ顯ハル、畫影ノ種々ニ變動流移スルガ如ク、ツヒニ著落セル實形トナリテ、永續スル功效ハアラザルナリ、

邦國ニ自主自立ノ權アルヲナレトモ、其自主ノ基礎ハ人民ノ性行ノ上ニアルナリ、而シテ此人民ノ性行ハ、實ニ衆志ヲ合セ、保全ヲ謀リ、邦國百事ヲシテ上進セシムルノ擔保ナリ、

九  
彌爾曰ク霸政ノ國ト雖モ、人民ニ箇々自立セルモノアル間ハ、極惡ノ徵候ヲ生セズ、且ツ何ノ政體ヲ論セズ、凡ソ人



ハ、ラル、ト雖モ、コレヲ稱シテ奴隸ノ最モ卑シキモノト  
イフベカラズ、人民ノ德行ヲ修ムルヲ知ラス、自ラ私スル  
ノ心、及ビ邪惡ノ心ニ役使セラル、モノヲユソ、眞成ノ奴  
隸ト名ツケテ、當レリト云ベケレ、

カクノ如ク、人民ノ心中ニ私欲生ジ、コレガ爲メニ奴隸ト  
セラル、モノハ、タトヒ如何様ニ法度ヲ變ジ執政ノ人ヲ  
改ムルトモ、コレ等ノ事ノミニテハ、コノ奴隸ヲ救フテ、自  
主ノ人ニ化セシムルヲ能ハザルナリ、ソノ國ノ政府ニテ  
自由ノ權ヲ專ラニシ、人民ヲ抑ヘ下スヲ以テ善シトス  
ル不祥ノ謬說行ハル、間ハ、官吏ヲ換ヘ政事ヲ變ズル等

モ、ヒトヘニ誤ツテ、已レ等ノ幸福ヲ受ケ、平安ニ日ヲ度ル  
ヲハ、法度ノアル所以ニ由ルヲ多クシテ、自己ノ所行ニ由  
ルヲ少ナシト思ヘリ、且ツ人民ノ開化ニ進ムヲハ、法度ヲ  
立ルヲニ由テ得ラル、モノト思フヨリシテ、法度ヲ立ル  
ヲチ、分外ニ貴トメル通俗ノ説トハ成リタルナリ、

Trans: p. 45

## Example II

七 凡ソ人、外ヨリ統治セララル、ヲニ由リテ、生スルトコロノ  
利害ハ、其關係スル所口甚ダ小ナリ、蓋シ人間万事、ミナ人  
々内自ラ治メ自ラ主トルヲノ上ニ關係スルモノナリ、是  
故ニ、君上權ヲ專ニスル國ノ人民ハ、ダトヒ惡政ヲ以テ治

六

蓋シ我モシ他人ノ爲ニ助ケヲ多ク爲サンニハ、必ズソノ人ヲシテ自己勵ゲミ勉ムルノ心ヲ減セシムルヲナリ、是故ニ師傅ノ過嚴ナルモノハ、ソノ子弟ノ自立ノ志ヲ妨グルヲニシテ、政法ノ群下ヲ壓抑スルモノハ、人民ヲシテ扶助ヲ失ヒ勢力ニ乏シカラシムルヲナリ、

邦國ニテ立ツル所ノ法度、タトヒ美ヲ盡シ善ヲ盡スト雖モ、人民ノ爲メニ眞實ノ助ケトハナラザルヲナリ、蓋シ人民ヲシテ、自己ノ爲ルトコロニ任セ、其志ヲ伸ブルヲ得セシメ、ソレヲシテ自己ニ勉勵進取セシムレバ、スナハテ人民ノ爲メニ眞實ノ理トナルヲナリ、然ルニ何ノ世ノ人

Example I

天ハ自ラ助クルモノヲ助クト云ヘル諺ハ、確然經驗シタル格言ナリ、僅ニ一句ノ中ニ歴レク人事成敗ノ實驗ヲ包藏セリ、

自ラ助クルノ精神ハ、凡ソ人タルモノ、才智ノ由テ生ズルトコロノ根原ナリ、推テコレヲ言ヘバ自ラ助クル人民多ケレバ、ソノ邦國、必ラズ元氣充實シ、精神强盛ナルヲナリ、

他人ヨリ助ケテ受テ成就セルモノハ、其後必ズ衰フルヲアリ、然ルニ内々自ラ助ケテ爲ス所ノ事ハ、必ズ生長シテ禦クベカラザルノ勢アリ、

Examples of Translation culled  
from various authors————

儻兮赫兮喧兮、有斐君子、終不可誼兮、如切如磋者、道學也、如琢如磨者、自脩也、瑟兮僾兮者、恂慄也、赫兮喧兮者、威儀也、有斐君子、終不可誼兮者、道盛德至善、民之不能忘也、

大學

Daigaku, p.2, 3.

故天將降大任於是人也、必先苦其心志、勞其筋骨、餓其體膚、空乏其身、行拂亂其所爲、所以動心忍性、曾益其所不能、人恒過、然後能改、困於心、衡於慮、而後作、徵於色、發於聲、而後喻、

孟子

Mencions., VOL.IV - p.61

二

夫勇士擐甲冑而守宮、則所有者安固、惟更勇者至而勝之、則奪其所特之甲冑、而分其贓、不與我偕者、則攻我、不與我斂者、則散也、

Luke. XI - 21, 22, 23.

夫燭照於身者、目也、目瞭、則全身光、目眊、則全身暗、愼之哉、爾光勿暗、倘全身有光、無一毫之暗、則其光全、似燈之光、焰照爾矣、

Luke. XI - 34, 35, 36.

喜怒哀樂之未發、謂之中、發而皆中節、謂之和、中也者、天下之大本也、和也者、天下之達道也、致中和、天地位焉、萬物育焉、

中庸

Chung-yo. p. 2.

詩云、瞻彼淇澳、萋竹猗猗、有斐君子、如切如磋、如琢如磨、瑟兮

爾遵法、則割禮有益、爾犯法、雖已割若未割然

Rom 11-25.

蓋上帝之諭、活潑潑地、自有功效、利於鋒刃、凡神氣骨髓、無不  
剖刺心意、無不鑒察、故於上帝前、萬物不得隱、豁然顯露、均  
爲鞠我之主所視焉 Heb. IV-12,13

故當黽勉、有信宜、有德、有智、有智宜、有節、有節宜、有忍、  
有忍宜、有虔、有虔宜、有弟、有弟宜、有仁、 2 Pet. 1:5,6,7.

基督爲教會首、爾居仁而言實、萬事託之生長、賴基督全體聯  
絡鞏固、百節相承、依才運動、故能生長、充周以仁、

Ephes IV—15,16.





Quotations from the Delegates Version of the Chinese New  
Testament, and from Mencius, and Confucius

2.00

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## THE WATER SUPPLY OF TÔKIÔ.

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BY O. KORSCHOLT.

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*[Read December 12th, 1883.]*

A paper on the water supply of Tôkiô was read before this society on the 24th November, 1877, by Mr. R. W. Atkinson. As already described by him, that part of the city which lies on low ground between Kandagawa and the river called Shinborigawa, which flows into the sea near the gas-works, including Nihonbashi-ku, Kiyobashi-ku, the greater part of Kanda-ku and Shiba-ku, as well as Kojimachi-ku, with the exception of Bancho and Surugadai and Yotsuya-ku, are supplied by means of pipes which bring water from the Tamagawa. The northern part of the above mentioned district receives Tamagawa water, which has been joined by water from three ponds, and which is then called Kanda water. Further details on the Tamagawa water supply are given in Mr. Atkinson's paper. For the last two or three years Tamagawa water has also been supplied to Hongo, Uyeno, Shitaya, Asabu and Asakusa, but is not yet used by the people to any great extent.

In the other parts of the city well-water only is used, namely, in Asakusa-ku, parts of Shitaya-ku and Kanda-ku, Honjo, Fukagawa, Mita, Takanawa and the elevated districts not before mentioned. Honjo and Fukagawa receive besides Tamagawa water brought over the river in boats.

Mr. Atkinson analysed Tamagawa and Kanda water taken at different parts of the supplied districts as well as a number of well-waters. The result of his analyses were summed up by him as follows :

"1. The waters supplied to the city are originally good, but become deteriorated by passage through wooden pipes.

"2. Most of the surface-waters are dangerous, and some are exceptionally bad."

His analyses show very clearly how the river-water, when it enters the city pipes, is very pure (Tamagawa water at Kojimachi go-chome contains only 6 parts solids and 0.65 parts Chlorine, and Kanda water at Sekiguchi Koishikawa 9.8 solids and 0.79 Chlorine in 100,000 parts of water), then it gradually takes up impurities while it is running through the pipes, until, at the end of the supply, it is badly contaminated. (Tamagawa water at Reiganjima contains 26 parts solids and 4.35 parts Chlorine, and Kanda water at Riogoku-bashi 29 parts solids and 4.95 parts Chlorine).

The well-waters which Mr. Atkinson analyzed, 29 in all, proved generally to be bad drinking waters. The total solids amounted to 16.75-152.5, but in most cases lying between 35 and 70 parts. The Chlorine was found to fall between 0.55 and 49. Those waters which must have had a saltish taste being excluded, the Chlorine is generally as high as 4 to 6 parts, while 2 to 3 parts Chlorine in 100,000 parts of water is the maximum quantity for a good drinking water to have. These Tôkiô well-waters should therefore be condemned, if they prove to be unsatisfactory in other respects also. The permissible maximum for total solids is 50, for nitric acid 0.5-1.5, while the ammonia should be found only in traces. These requirements, together with that for Chlorine, are all fulfilled by only 3 waters of the 29 analysed by Mr. Atkinson. They are :

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IN 100,000 PARTS OF WATER.

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Locality of well	Solids.	Chlorine	Nitric Acid.	Ammonia.
Mukojima, 110 .....	35.6	2.72	0.45	0.003
Koishikawa, Kanatomicho, 22 ....	34.8	0.41	0.48	0.004
Mukojima, Kommemura 64 .....	19.4	0.55	0.12	0.002

Two other waters come very near to the limits :

Kagayashiki, Hospital, Hongo ....	21.8	3.7	0.36	0.003
Daigaku, Hitotsubashidori .....	16.8	1.2	0.10	0.085

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With the Daigaku water the number given for ammonia, 0.085, is most likely a misprint for 0.005, for when I tested this water for ammonia qualitatively I judged it to be that quantity only.

When we consider the nature of the localities these five good waters come from, it is a matter of surprise to find that three of them come from marshy places, where just the worst drinking water would be expected. It is a well-known fact that the Daigaku stands on a place which several centuries ago was a swamp, since filled up artificially. There is, besides, the moat of the castle, containing very dirty and probably brackish water, not 200 feet distant from the well. The good quality of the Mukôjima waters is even more astonishing. The well-waters on the left side of the Sumidagawa are notoriously bad, brackish, and not fit for use. Now Mr. Atkinson's analyses inform us that there are, in this unfavourable locality, which 600 years ago was surrounded by the sea, as the name and other evidence shows, two wells which give good, and one of them (Komme-mura 64) even splendid, water.

There is only one explanation possible for this fact, and Mr. Atkinson gives it in the following words :

"The purest of these surface waters is undoubtedly that from Mukôjima, which shows very little more impurity than is contained in the Tamagawa, or Kanda waters at their sources. The water is obtained here by digging a hole in the ground and sinking a bamboo-pipe, when the water rises to within a short distance from the ground. It is thus a species of artesian well, and as its reservoir is probably situated some considerable distance below the surface, to which sewage has less opportunity of gaining access, its high degree of purity is explained."

If Mr. Atkinson had enquired about the other Mukôjima well and that in Daigaku, the analyses of the waters of which, together with many others of surface waters he published in the society's transactions, vol. vii. p. 309, he would have been informed that they too were artesian wells, and then the subject of the present paper would have been anticipated by him.

If we separate the waters analysed by Mr. Atkinson into two groups, high ground waters and low ground waters, and calculate the average composition of each group, we obtain the following numbers :

## I.—HIGH GROUND WATERS.

Locality of the well.	Solids.	Chlorine.	Ammonia.		Oxydised Nitrogen.	Previous Sewage Contamination.
			Free.	Albumenoid.		
Koishikawa Kanatomicho 22	34.75	0.41	0.004	0.007	0.48	4475
Ichibancho 49 .....	43.5	8.30	0.003	0.006	0.72	6910
Surugadai Nishikobaicho 12	75.0	12.67	0.012	0.009	3.34	33154
Kaga yashiki Hospital, Hongo	21.75	3.70	0.003	0.003	0.36	3325
Hongo Kinsukecho, 51 .....	48.5	4.06	0.008	0.046	1.35	13253
Hongo Ichome, 2 .....	93.2	6.90	0.006	0.011	0.51	4865
Hongo Kagayashiki, 6 .....	59.2	12.30	0.010	0.010	1.96	19380
Hongo Kagayashiki, 8 .....	66.45	16.40	0.002	0.017	3.23	32022
Yushima Mikunimachi, 7 ..	152.5	28.46	0.007	0.019	1.69	16630
Rokubancho .....	56.9	10.40	0.003	0.025	1.59	1530
Akasaka Tangomachi 1 ....	43.5	4.90	0.004	0.008	0.69	6584
Akasaka Hitotsugi 57 .....	49.2	8.97	—	0.040	1.22	11880
Awayama .....	69.6	10.00	0.006	0.036	1.13	11040
Azabu Roppongi .....	74.0	14.90	0.023	0.093	1.46	14510
Yamato yashiki .....	70.8	15.70	0.003	0.040	1.91	18810
Yanaka Tennoji, Uyeno ....	35.6	14.00	0.007	0.027	0.17	1404
Tennoji Toriimaye .....	85.3	19.80	0.010	0.009	0.65	6286
Average .....	63.51	11.29	0.007	0.023	1.33	12130

## II.—LOW GROUND WATERS.

Locality of well.	Solids.	Chlorine.	Ammonia.		Oxydised Nitrogen.	Previous Sewage Contamination.
			Free.	Albumenoid.		
Asakusa Kita Kiyojimachi 15	41.15	5.45	0.008	0.003	0.62	6001
Mukojima Kommemura 64..	19.35	0.55	0.002	0.007	0.12	912
Honjo, Koidzumicho 22....	30.75	3.75	0.065	0.018	0.10	1351
Fukagawa Ishizakacho 32 ..	59.55	22.05	0.044	0.033	0.12	1285
Dai Gaku Hitotsubashidori..	16.75	1.20	0.005	0.021	0.10	1530
Mita Sanchome .....	32.60	6.60	0.039	0.034	1.31	13165
Fukagawa Mongencho Maruta 71.....	?	49.0	0.132	0.012	0.09	1915
Fukagawa Naka Daikumachi	53.70	24.0	0.073	0.017	0.05	857
Honjo Araimachi 7.....	48.5	4.28	0.116	0.016	1.39	13738
Mukojima 110.....	35.6	2.72	0.003	0.017	0.45	4217
Ushigome Iwatacho 6.....	17.3	2.35	0.002	0.005	2.25	22210
Average .....	35.52	11.09	0.044	0.017	0.60	6107

The comparison of the two averages gives the startling result that the high ground water of Tôkiô is twice as impure as the low ground water.

As Mr. Atkinson did not separate his well-waters into these two groups, he only got the impression from his analyses that the surface-waters in Tôkiô were the more impure the deeper the well was, and tried to explain this state of things by the proposition that the deeper the water sinks, the greater will be the amount of impurity taken up by it. He here confused the depth of the surface of the water in the well with the real depth of the well, and forgot that there are many wells in the low lying districts of the city with the same depth as those in the high lying districts (30 feet or more), although invariably the water in the low ground wells is only 1 to 14 feet distant from the surface. Mr. Atkinson's explanation of the greater impurity of the high ground wells, which were what he meant when speaking of deep wells, cannot be accepted. The rain-water finds the organic impurities mainly on the surface of the soil and not uniformly distributed through the whole depth, and as it sinks down must get purer by the slow oxidation of the organic matter dissolved in it, which must be especially quick in the highly porous soil of the Tôkiô hills. If the water in the low ground wells is only surface-water, it must be more impure than the hill water for two reasons: first, the low districts being more densely populated than the hilly ground, the amount of impurities taken up by the rain-water must be much greater there; secondly, the level of the ground water is only some feet from the surface, and there is here consequently much less time for oxidation of the surface water whilst it is sinking down to this. I see only one way to account for the greater purity of the low ground water, and that is, that *below Tôkiô there is pure water rising upwards in the soil.*

If this supposition should be true, it must be possible to obtain pure water everywhere, both in the low and high districts of Tôkiô by a sufficiently deep well, and in the low districts the water must always rise near to the mouth of the well. The uppermost layers of the ground water will be actual surface water; below them there will be a mixture of surface water and pure underground-water, the latter prevailing more with increasing depth, until at a certain depth the underground-water will be found in its original purity. This depth will differ with the porosity of the soil at each place, being for instance much greater in Fukagawa or Tsukudajima, which places are newly deposited ground,

than in the districts farther from the sea. Besides this, the purity of the water in a well will depend upon the amount of leakage or diffusion taking place in the wooden tubs which form the shaft of the wells. Mr. Atkinson has shown what a considerable amount of impurities is taken up by the Tamagawa water flowing in the city pipes. In every case, well-water standing in a shaft with leaking, rotten tubs will easily become utterly spoiled.

These ideas about the underground water of Tôkiô I formed soon after my arrival in this country, when I had read the analyses done by Mr. Atkinson and seen the neighbourhood of Tôkiô. But until lately, I have always been prevented from putting my theory to the test. During the last few months, however, I have had about sixty analyses made of deep well-waters from the low lying districts of Tôkiô, which, I believe, prove that very good water can be got everywhere in Tôkiô by digging a well of between 60 and 250 feet in depth.

The deep wells of Tôkiô are, with very few exceptions, constructed in the same manner as the Mukojima well described by Mr. Atkinson. A shaft is sunk, about 20 to 30 feet deep, the sides and bottom of which are made water-tight by wooden tubs. From the bottom a bamboo pipe or a series of bamboo pipes is driven down to the required depth. The diameter of the pipes is usually about 2 inches. No great difficulty is encountered in driving down the pipes, the resistance of the soil not being great and no large stones being met with. Only with very deep wells is there some trouble with the last portion of the depth, but this is mainly due to the custom of the well-makers to discontinue the ramming during night.

At first it was very difficult to find out such wells, which are called *hori-nuki ido*, but afterwards we consulted the well-makers and got all the information we wanted. There are many, certainly many hundred artesian wells in the city, although very unequally distributed. They are found in greatest number in Asakusa-ku, and there are also many in Shitaya-ku. The reason for this is apparent. Neither district is supplied with Tamagawa-water, and the certainty of obtaining good water by driving a pipe-well is there very great, the soil being old. Many artesian wells are in Kiyobashi-ku, but I heard only of few in Nihonbashi-ku. In Shiba-ku their number is very small, and I believe



we have analyzed all or nearly all from that district. The number of artesian wells in Kanda-ku and the lower parts of Kojimachi-ku is also not very great. In Honjo and Fukagawa there are many pipe-wells, but the pipes are in most cases short, only one bamboo length. They give therefore surface-water only, which of course is very bad there. Such wells as these are also frequent in Shiba. The well-makers speak of them as being built after the Ôsaka-fashion. In Ôsaka, it is said, only such wells exist. They may in that city give better water, especially in the low districts, as there the underground water is river-water and probably flows with the river. I heard only of few deep wells in Honjo and Fukagawa, the water of all of which we have analyzed. In the villages higher up on both sides of the river deep wells are more frequent.

The numerous small valleys which intersect the low table land surrounding Tôkiô contain many deep wells, even in villages separate from it, and it is a remarkable fact, that in many of these wells the water overflows. I did not take any special care to learn the number of such overflowing wells, but I heard of many of them. Five such wells are in Totsukamura and Nakanomura, two villages in Toyoshimagori in the valley of the Kandagawa  $1\frac{1}{2}$  ri behind Ushigome. Three are in Koishikawa, Otowa, one at the foot of Ushigome hill, one in Netsu below Kagayashiki, one in Shitaya below the Tôkiô library, four in Kanda between Kanda and Surugadai, one in Shiba in the small valley behind Atagoyama, and one in Shinagawa. Several are said to be at the foot of Dokanyama, which is the border of the table land between Uyeno and Oji, and one is at Kamimeguromura, from which the houses of the village are supplied with pipes. With one of these wells nearly all foreigners in Tôkiô will be acquainted. It is the well at the last resting place approaching Tôkiô on the Nakasendô, just at the foot of the table land. The same delicious water as this well has, is found in all wells with overflowing water, and in all deep wells of sufficient depth and with water-tight tubs. Only two of the overflowing wells have less pure water, those namely in Shiba and Shinagawa. The well behind Atagoyama is probably only an outlet of the surface-water sinking down in the populated high districts of Nishinokubo and Asabu. Perhaps also the surface-water from Atagoyama supplies this well, but certainly not alone,

as the water would then be purer. The small quantity of water flowing out there as compared with the other wells, seems to prove this. Still less water is given out by the well in Shinagawa, Susaki. In regard to the other wells, there can be no doubt at all that they are artesian wells and not springs. There are indeed some springs in Tôkiô at the foot of the hills, and two of them I know, one of which is in Yamato Yashiki and the other in Akabane, each feeding a small pond. The quantity of water they give is insignificant, and the water has another composition than that from the artesian wells, as the analysis of the Akabane water shows.

The foregoing table contains the analytical results obtained with 78 waters. They are all, down to 64, from deep wells with the exception of 55, the Akabane spring water. 65-77 are from the Tamagawa and Kanda water supply taken outside Tôkiô, and 78 is a pure high-ground water given as an instance that in the not densely populated district upon the hills the well-water is good.

The headings of the table will be understood at once; only the 12th, "Oxygen," requires an explanation. It means the amount of Oxygen in the shape of permanganate of potash required to oxydize the organic matter in the acidified water.

The requirements a good drinking water must fulfill are, in my opinion, the following :

100,000 parts of water must have—

1. Not more than 50 parts residue ;
2. Not more than 2-3 parts chlorine ;
3. Not more than 8-10 parts sulphuric acid ;
4. Not more than 20 parts lime and magnesia together ;
5. Not more than 0.5 to 1.5 parts nitric acid ;
6. Only traces of ammonia and nitrous acid ;
7. Must require not more than 0.25 oxygen to oxydize their organic matter.

The greater part of the 64 well-waters analysed have given numbers which remain below these maxima ; a good many, however, are objectionable in one or more respects.

Twelve overflowing wells were analysed. Nine of them had very good water, completely clear, colourless and tasteless, but all containing only

DEEP WELL-WATER IN TOKIO.—IN 100,000 PARTS.

LOCALITY.	RESIDUE.	SILICA.	ALUMINA FERRIC OXYDE.	LIME.	MAGNESIA.	POTASH.	SODIC OXYDE.	CHLORINE.	SULPHU- RIC ACID SO <sub>3</sub>	NITRIC ACID N <sub>2</sub> O <sub>5</sub>	NITROUS ACID N <sub>2</sub> O <sub>3</sub>	OXYGEN.	AMMONIA.	DEPTH OF WELL.	LENGTH OF PIPE.	DISTANCE OF WATER FROM SURFACE.
1. Totsukamura 76, Toyoshimagori....	12.30	4.72	0.07	1.67	1.82	0.11	0.24	0.78	0.15	0.16	0.11	0.06	Distinct trace	—	96	Overflows
2. do. 154, do.	14.70	5.52	0.02	2.17	1.32	0.35	0.98	0.88	—	0.16	Not det.	0.08	Slight trace	—	unknown	do.
3. Nakanomura 1489, do.	13.12	5.76	0.06	2.65	1.24	0.20	0.74	0.68	—	0.16	" "	0.11	" "	—	33	do.
4. do. 1512, do.	12.40	4.77	—	1.52	0.92	0.25	0.68	0.88	—	0.14	" "	0.10	" "	—	72	do.
5. do. 162, do.	12.72	4.78	0.06	2.25	1.34	0.09	1.22	0.68	Trace	0.14	0.05	0.07	Distinct trace	—	unknown	do.
Koishikawa-ku.																
6. Shinsuwacho 24.....	31.79	6.74	1.37	6.70	2.02	0.33	3.34	4.79	5.32	0.07	—	0.05	Slight trace	20	unknown	Overflows
7. Otowa rokuchome 15 .....	15.12	6.55	Trace	2.60	0.74	Trace	1.44	0.68	Trace	0.07	—	0.07	Distinct "	4	90	do.
8. Sekiguchi-cho 101.....	12.36	5.08	"	2.10	0.63	"	1.02	0.68	"	0.07	—	0.05	Strong "	8	37	do.
Kanda-ku.																
9. Nakasarugakuchō 17.....	12.22	4.99	Trace	2.02	0.54	0.10	1.25	0.69	Trace	0.25	0.02	0.13	Distinct trace	12	198	Overflows
10. Imagawakoji nichome 1 .....	..	..	..	..	..	..	..	0.69	..	0.20	0.04	0.42	" "	12	132	do.
11. Daigaku near main gate .....	18.52	5.15	0.15	3.24	1.16	0.20	0.84	0.88	Trace	0.27	0.01	0.18	" "	22	unknown	7
12. do. do. library .....	25.06	3.87	0.28	6.95	1.70	0.15	1.28	2.45	"	0.29	0.01	0.18	" "	17	do.	7
Shitaya-ku.																
13. Nishikuromoncho 5 .....	19.80	5.19	0.13	3.50	0.32	0.46	3.36	1.95	0.48	0.24	—	0.10	Slight trace	32	120	9
14. Hirokojimachi 18 .....	13.94	5.46	Trace	3.41	1.10	0.20	1.70	0.78	Trace	0.29	0.01	0.08	" "	24	105	10
Asakusa-ku.																
15. Koyenchi, near temple Yemado ....	16.15	5.85	0.14	1.65	0.55	0.59	3.66	0.88	Trace	0.29	—	0.03	Distinct trace	44	unknown	14
16. Shodencho 16.....	19.74	6.84	0.30	2.07	0.68	0.15	2.90	1.37	"	0.29	—	0.08	" "	28	do.	12
17. do. 27.....	21.48	5.98	0.15	2.01	0.66	0.27	4.13	1.75	0.15	0.29	—	0.08	" "	28	do.	14
18. Shimoheiyemoncho 24.....	30.93	5.85	0.81	3.95	2.75	0.95	5.50	4.01	Trace	0.15	0.01	0.13	Strong "	34	do.	14
19. Minamimotomachi 27 .....	26.35	5.41	0.19	2.70	1.75	1.04	5.81	3.03	0.44	0.14	0.01	0.13	Distinct "	28	216	10
20. Imadomachi 3 .....	18.05	6.29	0.05	0.50	0.55	0.41	4.78	0.88	Trace	0.14	0.01	0.11	" "	24	unknown	10
21. Yoshinomachi 37 .....	17.48	5.65	Trace	1.68	0.10	0.39	2.57	0.68	—	0.14	—	0.08	" "	24	165	8
22. Shinyoshiwara Yedocho nichome 1..	23.68	5.79	"	3.34	1.82	Trace	3.51	1.86	—	0.21	—	0.11	" "	24	unknown	10
Senji-Mill.																
23. ....	13.08	5.44	0.06	0.81	0.78	—	2.50	0.73	Trace	0.21	0.06	0.04	Slight trace	32	62	..
24. ....	13.10	5.20	0.05	1.88	0.63	0.23	2.34	0.73	—	0.34	0.06	0.11	" "	36	129	..
25. ....	13.44	5.70	—	1.35	0.35	0.25	1.17	0.59	—	0.24	0.03	0.12	" "	30	187	..
26. ....	19.00	4.82	0.32	1.92	1.83	0.77	3.74	0.88	N. det.	0.24	0.03	0.12	Distinct "	35	..	..
Nihonbashi-ku.																
27. Shinyoshicho 9 .....	20.03	5.99	0.14	1.16	1.80	1.23	3.16	1.66	—	0.24	—	0.13	" "	36	unknown	14
28. Kakigaracho 12 .....	61.42	5.62	0.62	7.19	3.64	1.70	19.67	12.82	0.20	0.24	0.14	0.76	Much	24	do.	12
29. Hamacho nichome 11 .....	33.90	7.86	0.44	3.65	1.80	0.15	6.32	3.23	0.15	0.18	0.12	0.37	"	37	do.	14
Kiyobashi-ku.																
30. Minamimachiko 1 .....	21.45	5.21	0.61	3.1	2.05	1.10	1.97	3.23	Trace	0.24	—	0.10	Slight trace	28	102	9
31. Kobikicho nichome 13 .....	14.75	5.12	0.12	1.6	1.42	0.25	1.17	1.96	—	0.16	0.11	0.06	" "	22	unknown	3
32. do. sanchome 12 .....	58.60	5.52	0.30	4.1	6.74	2.03	5.31	10.98	0.74	0.22	0.06	0.31	Much	..	..	..
33. Tsukiji Seiyoken .....	14.78	4.76	0.20	1.5	1.92	0.38	0.79	1.08	0.19	0.18	0.05	0.11	Slight trace	22	68	8
34. do. Irifuncho, Ice works....	54.45	4.85	0.15	8.4	5.70	2.04	10.08	16.78	0.05	0.22	0.05	0.25	" "	78	..	..
35. do. do. do. ....	60.50	4.02	0.24	8.7	4.17	1.42	12.64	18.89	0.48	0.18	0.11	0.30	" "	73	..	..
Tsukudajima.																
36. Prison, large well in the kitchen....	92.32	5.13	0.47	12.14	5.62	1.94	21.86	36.71	2.20	0.22	0.04	0.99	Much	36	72	10
37. do. small do. do. ..	208.80	4.68	0.88	35.33	14.68	2.63	40.73	98.08	5.59	0.24	0.05	?	"	36	54	10
38. do. tannery.....	338.80	4.38	1.68	68.90	18.48	3.01	62.05	168.70	7.13	0.22	0.02	3.57	"	36	72	10
39. do. workhouse .....	..	..	..	..	..	..	..	346.74	..	0.26	0.04	?	Very much	168	81	10
40. do. carpenters' yard .....	..	..	..	..	..	..	..	155.63	..	0.24	0.06	?	" "	180	unknown	10
41. do. before the prison.....	..	..	..	..	..	..	..	336.71	..	0.19	0.02	?	" "	180	do.	10
42. do. do. do. jailers' houses ..	59.70	5.98	Trace	6.60	2.58	0.91	18.50	12.72	0.14	0.24	0.14	0.81	Slight trace	180	72	10
43. Shimo-Tsukudajima 15.....	617.00	5.88	0.46	58.05	63.20	2.15	161.94	306.11	27.26	0.18	—	0.42	Much	27	unknown	9
Kojimachi-ku.																
44. Central Police Office.	19.80	5.47	0.47	1.25	3.07	1.22	3.04	2.54	—	0.25	0.03	0.19	Distinct trace	18	162	7
Shiba-ku.																
45. Karasumoricho 1 .....	33.62	5.70	0.30	1.05	1.52	0.32	6.32	5.67	Trace	0.36	0.02	0.28	Much	?	90-120	6
46. Shibaguchi nichome 7 .....	16.90	2.90	0.10	3.82	0.96	0.25	1.77	1.36	0.15	0.32	0.01	0.20	Slight trace	24	45	8
47. Shimbori 32 .....	60.50	2.97	0.02	13.9	4.40	1.19	10.71	12.42	2.14	0.32	—	0.20	—	20	unknown	3
48. Minamisakumacho nichome 2.....	20.40	5.22	Trace	3.65	..	..	2.21	3.03	0.24	0.10	—	0.13	Slight trace	24	do.	8
49. Nishinokubo, Tomoyecho 49 .....	55.68	4.46	0.15	4.81	1.39	0.05	2.21	3.03	0.24	0.10	—	0.05	—	16	38	Overflows
50. Tamachi nichome 18.....	85.74	3.22	0.26	12.7	4.52	0.31	9.20	11.93	2.39	0.26	—	0.05	—	28	unknown	6
51. Kurumacho 27 .....	38.24	5.60	0.46	8.0	7.48	1.49	22.10	18.09	2.26	0.21	0.03	0.37	Strong trace	37	no pipe	2
52. Takanawa Minamicho 13 .....	35.72	6.42	0.66	10.0	1.54	0.61	3.04	6.74	3.06	0.29	0.01	0.23	" "	36	unknown	3
53. Shirokane mura 25 .....	23.46	7.85	0.20	1.4	2.30	0.21	3.67	5.88	0.15	0.24	—	0.08	Distinct t trace	12	38	4
54. Akabane .....	41.54	7.55	Trace	6.74	1.15	0.95	4.73	2.34	0.24	0.19	—	0.08	" "	?	unknown	6
55. Akabane, Spring water.....	25.80	1.75	Trace	4.95	2.27	0.97	7.32	3.23	3.93	0.14	—	—	Slight trace	..	..	..
Shinagawa.																
56. Susaki Itashinji 2.....	38.65	5.37	0.07	5.04	1.75	1.82	6.32	2.06	..	0.17	0.02	0.08	—	..	..	..
57. Fort No. 2 .....	179.70	6.68	0.55	3.34	1.93	0.56	10.27	3.13	0.38	0.36	0.22	1.11	Distinct trace	8	30 ?	Overflows
Fukagawa.																
58. Fudosan Hachiman.....	170.60	5.00	0.10	3.55	4.88	1.64	80.97	56.72	0.58	1.00?	?	5.12	Very much	22	unknown	2
59. Morishitacho 7 .....	57.90	5.47	0.57	1.22	8.48	3.00	53.79	95.26	..	0.19	0.12	..	Much	32	unknown	10
Honjo.																
60. Motomachi 17.....	29.90	8.97	0.17	2.28	2.57	1.29	23.33	21.17	..	0.19	0.08	0.32	Distinct trace	36	do.	12
61. Kamisawacho 25 .....	21.72	7.80	0.05	0.16	1.33	0.99	8.09	3.92	..	0.14	0.09	0.32	" "	29	48	13
62. Terasima-mura 1485.....	22.68	5.29	0.40	0.42	0.54	0.25	3.26	1.27	—	0.19	0.02	0.13	" "	30	unknown	12
63. do. do. ....	..	..	..	..	0.42	0.15	0.88	1.76	—	0.12	0.08	0.28	Slight trace	7	do.	3
64. do. do. ....	..	..	..	..	1.49	..	..	1.08	..	0.17	0.11	0.42	" "	7	do.	3
Table land west from Tokio.																
65. Inokashira pond, 1. spring .....	8.77	4.15	Trace	0.60	0.75	Trace	0.68	0.83	0.15	0.05	—	0.05	Slight trace	..	..	..
66. do. do.																

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a remarkably small quantity of carbonic acid dissolved. They therefore lack the freshness of taste which is found in spring water generally, and which is due to the presence of free carbonic acid. Five of them are outside the city, in Totsukamura and Nakanomura to the north-north-west from Nihonbashi, Nos. 1-5; two are in Koishikawa, Nos. 7 and 8, and two in Kanda, Nos. 9 and 10.

The other three overflowing wells had water of inferior quality. That in Koishikawa Shinsuwacho, No. 6, is objectionable for its high amount of chlorine (4.8) only, and is therefore still to be classed among the good drinking-waters. It has besides much sulphuric acid, more than any other well with the exception of those in Tsukudajima, which is present as sulphate of lime, as is apparent from the analytical numbers. One could imagine that this water therefore is only the drainage-water from the neighbouring thickly populated hill; but this is quite impossible, as oxygen (0.05), nitric acid (0.07), and ammonia (slight trace) are found to be so low. The water, before rising up in the well, must have passed through a local deposit of sulphate of lime, or such water has entered the well through the tubs, which are pretty old.

The remaining two overflowing wells are in Shiba, Nishinokubo, (No. 49) and Shinagawa, Susaki (No. 56). The former has already been spoken of as the probable outlet of the surface-waters of the neighbouring hills. The latter lies near the sea-shore, and distinguishes itself by a dark brown-red colour. As ferric oxide is almost entirely absent (0.07), the colour is due to the presence of organic matter of an acid character. Three other wells had the same deeply coloured red water, No. 57 Shinagawa fort No. 2, and No. 28 Nihonbashi Kakigaracho, and No. 29 Nihonbashi-ku, Hamacho. The water from the fort has the deepest colour and required correspondingly the highest amount of oxygen. Ferric oxide is present in these three waters in relatively considerable quantities (0.55, 0.62, 0.44) and the colour of the water may be increased by it.

I do not believe that a layer of peat or other organic matter stretches below the south-eastern part of the city and below the bay and colours the water rising from below, as there are other waters in Tsukudajima, Tsukiji and Shiba requiring also much oxygen, which are, however, either completely colourless or only very slightly coloured, and

as other wells are found very near to those with the red water which contain nearly no organic matter. There seem to be only local deposits of organic, probably animal, matter; the coloured waters having all, with the exception of the Shinagawa water, much ammonia.

The Shinagawa well offers a very good instance in support of my assertion that water is rising from below under Tôkiô. The well lies on the small peninsula which forms the right bank of the small river, and is very near to the mouth of it. Its total depth is only 33 feet. If water did not rise from below, the water of this well would be brackish, as for instance in several wells in Tsukudajima. Besides, it cannot be supposed that the surface-water from Takanawa hill supplies this well. This could be done only by the last part of the hill, and there the hill is not at all broad, a valley parallel to the sea-shore being not half a *ri* distant from the latter. The water coming down from the hill underground would therefore get brackish before it enters the well, so that there must be another more abundant supply from another source.

\* The 49 deep wells which do not overflow vary very much in the purity of their water. The water of an overflowing artesian well can be contaminated only under exceptional circumstances. We therefore consider the water from the wells 1-5, 8 and 9 as typical representatives of the underground water of Tôkiô. Their analyses give as an average:

UNDERGROUND WATER OF TÔKIÔ, STANDARD COMPOSITION.

In 100,000 parts.

Residue .....	12.83
Silica .....	5.09
Alumina, Ferric Oxyde .....	0.03
Lime .....	2.05
Magnesia .....	1.10
Potash .....	0.16
Sodic Oxyde .....	0.88
Chlorine .....	0.75
Sulphuric Acid .....	0.02
Nitric Acid .....	0.15
Nitrous Acid .....	0.05
Oxygen .....	0.09
Ammonia .....	Distinct trace.

The water of none of the 49 deep wells reaches in purity the standard composition, many come very near to it and are, for every

practical purpose, just as pure as the standard water ; but even the wells of Senji Mills, which were constructed only some years ago, and the shafts of two of which are built with cement, have water with 0.4 parts residue more than the standard-water, 13.21 parts being the average of the wells 23-25. Well 26 from Senji must be left aside, as it is scarcely used, is the oldest of the four wells in Senji, and has wooden tubs. I shall give a reason for this fact later, when I speak of the probable origin of the underground water.

Of the 49 deep well waters, from which the water does not overflow,

6 have less than 15 parts residue.

17 " " " 25 " "

9 " " " 50 " "

17 " more " 50 " "

Among the waters with less than 25 parts residue there is only one, No. 30 Kiyobashi Minamimakicho, which does not fulfill all the requirements of a good drinking water, its chlorine (3.23) being found 0.2 higher than the maximum. But its deviation is such a slight one that it still can be considered a good drinking water. Of the nine waters belonging to the next group, 25-50 parts residue, six gave numbers which in one or several respects were higher than the maxima. These six waters are : No. 29 Nihonbashi, Hamacho, Oxygen=0.37. This water, as mentioned above, is coloured red. Nos. 45, 51, 52, 54, all in Shiba. Of these only No. 45 Karasumoricho is bad, being three times over the maximum with Chlorine, Oxygen and Ammonia. The other three have numbers too high only for chlorine. No. 54 Akabane is a good drinking water (Chlorine = 3.23). The remaining two, 51 Kurumacho, 52 Takanawa, are doubtful, as their chlorine is over 5.

The well No. 52 Takanawa has a very interesting peculiarity. The water in the shaft has a rise and fall of 4 feet with the tide. No sea-water, however, enters the shaft, as the taste of the water remains entirely unaltered. Besides, the water in the shaft stands several feet over the sea-level. Both facts combined seem to me to prove very convincingly (1) that the water of this well is not surface-water from the Takanawa hill, but underground-water ; (2) that this underground-water is actually rising upwards and flows out everywhere on the bottom of the sea ; and (3) that the quantity of water thus flowing out, although

The water No. 32 is in the house of a tôfu-maker. It has rotten tubs and has been spoilt by the mother-liquor of salt-boiling, which is used in tôfu-making, and contains mainly Magnesium chloride. The high amount of magnesia found in this water, 16.74, is thus explained.

In most of the waters the quantity of magnesia compared with the numbers obtained for lime is unusually high, sometimes even higher than the latter. The high numbers for silica are also quite unusual with European waters. Other peculiarities appear, when the numbers for the acid constituents (chlorine, sulphuric acid and nitric acid) are compared with those for the basic constituents (lime, magnesia, alkalies), showing that, contrary to the experience with European waters, chlorine is frequently insufficient to saturate the sodium, the latter being partly present as carbonate or perhaps as silicate. In other cases there is much more chlorine present than required by the sodium, then a great part of lime or magnesium is bound to chlorine. Following this subject more closely might perhaps lead to interesting results, but as the questions are purely chemical ones, this society is not the proper place to discuss them.

When I had established the fact that the underground-water of Tôkiô is under a pressure which makes it rise to the surface, I thought it might be the subterranean drainage-water of either the mountain-ranges west of Tôkiô or north. There was more probability that the water might come from the west, from that range which stretches between Fujiyama and Asamayama, as Tôkiô has the sea to the east of it. But when I found that so many of the artesian wells overflow, while others, although not far off from these, do not, and that the overflowing wells are all situated either at the foot of the table-land or its valleys, and that the level of the underground water in the low districts of Tôkiô is at least 40 feet below its level in Totsukamura, a distance of  $1\frac{1}{2}$  ri only, I concluded that the place where the underground-water comes from is much nearer to Tôkiô than that mountain range. If the water came from the latter it would be difficult to understand how the underground drainage could be on a higher level than the surface drainage, which is the Sumidagawa on the north and the Tamagawa on the south of Tôkiô. There remains consequently no other way than to suppose that this water comes from the low table-land which lies



between and beyond these two rivers. To settle this question I set out on a trip over this table-land, crossed it twice in its whole length between Tôkiô and the mountains, and in returning visited the four ponds Inokashira, Sambukuji, Miyoshioji and Samboji four *ri* west from Tôkiô, the water of the first three of which form the Kanda water-supply. The table-land consists, probably in its whole depth, of a red soil of volcanic origin, entirely unstratified and consequently not deposited under water. This soil is, as I presume, the ashes of neighbouring volcanos, strewn over the country by many eruptions and so gradually piled up to a layer of several hundred feet. I gave in a paper, published in the Transactions of the German Asiatic Society some years ago, several analyses of this soil, which brought me to formulate the above idea. As far as I am aware, it has not been accepted by any of the geologists who have seen the district; still I must say that continued and very detailed chemical investigation has strengthened my conviction that my opinion about the nature and origin of this soil is right. However, this only by the way. At present it is only necessary to know that this soil is not stratified and very porous, indeed more porous and lighter than any other soil known except peat soil. At Hamura, the farthest point I visited, on the left bank of the Tamagawa, where the Tamagawa water canal leaves the river, this table-land is 200 feet over the river and 500 feet over sea-level, while at Yotsuya, Tôkiô, it is 150 feet. A section between these two places is pretty accurately obtained by drawing a straight line between them. The table-land between Hamura and Inokashira, a distance of 8.9 *ri* along the Tamagawa water canal, is an entire plain, and it would be quite impossible to know in what direction it is inclined, if one did not see the water flowing in the canal. At Hamura the volcanic soil is mixed with sedimentary soil, and forms a layer of only several feet above river-boulders, which form the plateau in its entire height, an indication that a rising of the country has taken place for about 200 feet. Passing one or two *ri* along the Tamagawa canal towards Tôkiô, at a distance of less than one *ri* from the Tamagawa river, I again saw river stones. They lay there about 10 feet deep, and had got much smaller, of pebble-size only, fit to improve the roads with. Farther from the river its deposits must get smaller and deeper below the surface, until the table-land consists of volcanic soil only. This will probably be the case at no great distance from the river.

Valleys lead down from the table-land to both rivers, but those to the Tamagawa are short, and among those to the Sumidagawa there is only one of several *ri* in length. It opens into the Sumidagawa plain at Itabashi. The valleys leading to the sea are also short, with the exception of one which branches into three, with a pond at the end of each. This is the Kandagawa valley.

The rain-water falling on the plain is easily taken up by the porous soil, and has therefore had little reason to cut long valleys in the table-land. It sinks down in it, much more than in other soils. It is generally accepted that one-third of the rainfall sinks into the soil, one-third flowing off and one-third evaporating again. With the tufa-soil, as I have called the volcanic soil, that part of the rain-water sinking down is certainly larger, perhaps one-half. The table-land, too, is extensively covered with trees. Besides forests from which telegraph-poles and fuel for the city are got, there are innumerable small clumps of trees about the houses and scattered over the field, which give to the plain quite a picturesque appearance. These, of course, are also an obstacle to the flowing off of the rain-water. Again, it must not be forgotten that a considerable part of the water flowing from the plain to the Sumidagawa and Tamagawa is not the water of the plain, but water from the Tamagawa-canal. In the large valley I mentioned above, which leads to Itabashi, a not inconsiderable river, able to carry a small boat, flows with velocity. This is, to the extent of more than nine-tenths, water from the Tôkiô water-works, which is used in summer to irrigate the rice-fields of this valley. On the Tamagawa side it is the same. The quantity thus daily lost by the Tôkiô water-works amounts to 279.17 cubic-shaku per second, as measured by the engineers of Tôkiô-fu, that is 648,000 cubic meters per day.

The above-mentioned facts show that the greater part of the rain-water sinking down in the extensive table-land west from Tôkiô does only to a small extent appear again as spring-water. It consequently flows off subterraneously to the Sumidagawa and Tamagawa and to the sea. The two rivers form the boundary of the table-land for about 10-12 *ri* each, while the distance between their mouths is only 4 *ri*, the greatest part of the subterranean water of the plateau will therefore find its way to the rivers and only a small portion to the sea. It would be

only one-seventh of the total according to the above-given lengths, but is probably much more, as the table-land is inclined towards the sea. Supposing that there are 40 square *ri* table-land, that the annual rainfall is 1800 mm., that one-half of that enters the soil and that one-seventh of the subterranean water finds its way to the sea, the latter quantity would amount to 230,000 cubic meters per day, of which about one-half or 115,000 cubic meters would flow to the sea below Tôkiô. This is a quantity quite sufficient to supply a population of 4-5 millions, if it could be made available for that purpose. However, the quantity of water supplied to Tôkiô at present is still larger. Tôkiô receives per day through—

The Tamagawa jo-sui .....	88,650 cubic meters.
The Kandagawa jo-sui .....	61,350 " "
<hr/>	
Total .....	150,000 cubic meters.

I could collect only a few data about the quantity of water an artesian well in Tôkiô can furnish. The water flowing out from the five wells in Totsukamura and Nakanomura I measured myself with the following results :

Well No. 1	gives	1 litre	per	second	=	92	cubic	meters	per	day.
" " 2	"	0.6	"	"	"	=	55	"	"	"
" " 3	"	1.3	"	"	"	=	120	"	"	"
" " 4	"	1.2	"	"	"	=	110	"	"	"
" " 4	"	2.7	"	"	"	=	193	"	"	"

The diameter of the pipe in all of them was about 2 inches ; at the end of the pipe it will of course be much smaller.

Mr. Gergens, the engineer of the Tôkiô Ice Works, Tsukiji, Irifunecho, informed me that he can draw 4,000 cubic meters per day from the well which has two pipes, each of 2-3 inches diameter, if the pump takes off as much water as flows out from the pipes. I have myself seen that the water rushes out with great violence.

Again, it is a fact well known in Tôkiô that it is quite impossible to pump out an artesian well or even to lower the level of the water much by drawing the water as quickly as possible. If it is wanted to clean an artesian well, the pipes must first be shut.

Mr. Inouye Shozo, director of the Senji Mill, kindly put at my disposal the following particulars about the artesian wells of the mill, which are the largest and best built artesian wells of Tôkiô.

Well No. 23 has 9 feet inside diameter, and the shaft, which is built with bricks laid in cement, is 31.5 feet deep. The bottom of the shaft is in concrete. There is only one pipe, made of *hinoki*, and having 8 inches diameter. The total depth of the well is 94 feet only. The daily yield is about 1000 cubic meters.

Well No. 24.—The shaft has 8 feet diameter and 36 feet depth. *Hinoki* tubs; 2 pipes of  $3\frac{1}{2}$  inch bamboo. They end 103 and 165 feet from the surface. Daily yield 2000 cubic meters per day.

Well No. 25.—The shaft has 7 feet diameter and 30 feet depth. Made of Hattori cement; 3 pipes of  $3\frac{1}{2}$  inch bamboo. They end 95, 120 and 217 feet from the surface. Yield, 475 cubic meters per day.

Well No. 26.—Small well. The pipe ends 95 feet from the surface. Used only for culinary purposes.

The wells Nos. 23-25 could give much more water if required, at least Nos. 24 and 25. The former gives its 2000 cubic meters with the greatest ease; the water sinks only 2 feet when pumping begins, and then the height remains constant. There is no doubt that four or five times as much could be drawn.

The instances given leave no doubt that the artesian wells in Tôkiô are able to furnish any quantity of water required, and the wells in Senji Mill seem to show that with greater depth the quantity of the water does not improve, its maximum purity being already got with 100 feet, but that the water flows out in much greater quantities.

The present investigation has thus brought out one important result:

Manufactories can be started in any place in Tôkiô and may have their own supply of excellent water, by its softness especially good boiler-water, without relying on the Tamagawa water supply, to use which has many inconveniences, it being frequently stopped for repairs or the water-supply being reduced sometimes in the height of summer.

This satisfactory result will prove of great importance. The industrial district of Tôkiô will in future years occupy both banks of the Sumidagawa above Honjo and Asakusa, and it would be very inconve-

nient if the manufactories should have at their disposal river-water and Tamagawa water only. The last obstacle which might prevent the building of the future manufactories of Tôkiô on their proper sites is now removed.

When the wells in Senji were dug, Mr. Inouye observed that the ground there consists of alternate layers of gravel and of a fine grey soil. I had this soil analysed. The numbers obtained, are :

	Hydrated Silica.	Soluble in		Residue.	Total.
		Hydro- chloric Acid.	Sulphuric Acid.		
Silica .....	3.72	18.25	6.45	32.32	60.74
Alumina .....	..	8.89	2.75	4.35	15.99
Ferrie Oxyde .....	..	4.68	1.75	0.45	6.88
Lime.....	..	1.77	0.25	0.77	2.79
Magnesia.....	..	1.57	0.13	0.74	2.44
Potash .....	..	0.35	0.70	0.58	1.63
Soda .....	..	0.13	0.35	1.70	2.18
Loss on ignition.....	6.50	..	..	..	6.50
Sum .....	..	34.64	12.38	40.91	99.15

The soil consequently contains no clay, or very little of it ; it is Tufa which offers no great resistance to the passage of water through it, but is permeable. That no impermeable layer of clay exists under Tôkiô is already clearly shown by the fact that the artesian wells are of very different depths, and still the water in all rises nearly to the surface. The section obtained at Senji and the analysis above given place the fact beyond doubt that no layers of clay exist below Tôkiô. This is a new confirmation of the volcanic nature of the soil of the table-land.

Before discussing the question whether Tôkiô might not advantageously be supplied in part with underground water, I have to say some words on the water of the three ponds furnishing the Kandagawa supply. I had rather expected that these waters would give the same analytical results as the purest underground water of Tôkiô, being of the same origin with it. It was found, however, that they are much purer, giving on the average 6.7 parts solids only. In the following table I give under I. the average of Nos. 65-73 and 75 ; under II. the average of the purest underground waters Nos. 1-5, 8 and 9 ; and under III. the average of the three Senji waters Nos. 23-25.

	I.	II.	III.
Residue .....	6.65	12.83	13.21
Silica .....	2.84	5.09	5.45
Alumina, Ferric Oxyde .....	trace	0.03	0.04
Lime .....	0.65	2.05	1.35
Magnesia .....	0.64	1.10	0.59
Potash .....	0.10?	0.16	0.16
Sodic Oxyde .....	0.64	0.88	2.00
Chlorine .....	0.87	0.75	0.68
Sulphuric Acid .....	trace	0.02	trace
Nitric Acid .....	0.05	0.15	0.26
Oxygen .....	0.07	0.09	0.09
Ammonia .....	slight trace.	distinct trace.	slight trace.

These numbers appear to me to show with evidence that the longer the underground water remains in the soil, the more solid matter it dissolves out. Besides, a very interesting change is going on in it. Lime and Magnesia are first increased, but afterwards much diminished, while soda shows continual increase. It seems that Soda, if increasing over a certain limit, not being present as chloride precipitates Lime and Magnesia. Chlorine gets less the farther the water has flown. Can this mean, that below the ground-water from the table land there is rising another flood of water coming from the mountains, as suggested above, and containing less chlorine? Whether this is the case or that the ground water may not contain absolutely the same quantities of chlorine always and everywhere, it is impossible to decide.

The four ponds furnish a very good instance of what is going on at the bottom of Tôkiô bay with the ground-water. In two of the ponds no spring-water is flowing in (Samboji, Miyoshioji); Sembukuji has one small spring, Inokashira two. Again, no water can be seen springing up in the ponds; still from each of the ponds, especially from Inokashira and Samboji, a rather large rivulet flows off. The whole bottom of the ponds, which is quite level in all and covered only with about 8 feet of water, is a spring, water rising every where, as can be seen from the numerous air-bubbles.

The engineers of Tôkiô-fu have measured the quantities of water flowing off from the ponds and reaching Tôkiô, with the following result :—

Inokashira.....	per second	15.51	cubic shaku.
Sembukuji.....	“ “	6.53	“
Miyoshioji.....	“ “	0.86	“
Tamagawa-water <sup>1</sup> uniting with the Kanda water.....	“ “	22.51	“

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Total..... per second 45.44 cubic shaku.

After flowing several *ri*, and without receiving any visible supply, the Kandagawa-jo-sui has increased from 45.4 cubic shaku to 107.4 cubic shaku per second at Sekiguchi, that is, more than doubled. The engineers of Tôkiô-fu attribute this to the water drawn from wells and used for domestic purposes in the villages through which the *jo-sui* passes, and finally flowing into the latter. They therefore believe also that the Kanda water must be bad. As analysis No. 75 shows, it is just as good or even better than the Tamagawa-water, so that their explanation cannot be the right one. I believe that the underground water, just as it rises invisibly in the ponds, does so also in the river bed through its whole length, as its level in the table-land through which the valley leads, must be some feet higher than the level of the water in the river.

To give to Tôkiô a really good water-supply, it is only necessary to build reservoirs with filter-beds at Yotsuya and Sekiguchi to clean the water if it has got turbid through rain, and replace the wooden pipes in the city by iron ones. This can be done at an expense of 1½ million yen, according to the calculations of the Tôkiô-fu engineers. A foreign engineer in the government service, probably believing that the Tamagawa-water must get bad by running 14 *ri* in an open canal, has proposed to erect the reservoirs in Hamura on the Tamagawa, and to let the clean water flow in pipes to Tôkiô. The great expense this would incur would be entirely wasted, as is clearly shown by analyses Nos. 76 and 77, the former giving the numbers for the water at Hamura, the latter for the water at Yotsuya. The latter sample was taken half a day after the other. The analyses show that the water does not get worse, but rather better while running to Tôkiô. All numbers are lower in the Yotsuya water, with exception of those for magnesia and sulphuric acid. Oxygen 0.2 higher, which is inside the possible error of observation. It

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<sup>1</sup> As I have found out since, this is the water No. 71.

is possible that the Yotsuya water may give higher numbers if rain falls, but the difference cannot be very great. It therefore will be unnecessary to make any change with the water-works outside Tôkiô.

The improvements required are, compared with the expenses other towns incurred to obtain a supply of good water, very cheap, being only 6s. per head. In Europe this has been never less than 12-15s. and amounts in the average to 18-24s. per head; in exceptional cases, as in London, Marseilles and New York, being over 50s. Still, it is considered impossible by the Tôkiô-fu to spend the comparatively small sum of 1½ million yen on the improvement of the water-supply, at least at present. As long as this state of things lasts, there will be a possibility to supply those districts in which the Tamagawa-water is worse or which do not receive it at all, with underground-water. The Tôkiô-fu could build numerous public wells in the most unhealthy districts where infectious diseases are most violent, as for instance in that district of Nihonbashi-ku where Kakigara-cho and Hama-cho lie, and could encourage private person to change their surface-water wells into deep wells. In case infectious diseases appear, by shutting all wells with the exception of the deep wells, the people could be compelled to use the water of the deep wells only.

Honjo and Fukagawa, which have the worst water in Tôkiô, and where it will be expensive to make a deep well, a great depth being required, or even perhaps quite impossible, as in Fukagawa near the sea, should have their own water-supply from deep wells, which might be in Mukôjima. A steam-pump might raise the water from the wells to a small reservoir, whence it might flow in iron-pipes through the streets. Honjo and Fukagawa have a population of nearly 120,000, which at the rate of 20 litres per head require 2,400 cubic meters of water per day, which can be supplied by one or two wells like those in Senji. The engine required would be a very small one, only several horse-power, if the reservoir were not placed higher than was necessary to make the water run through the pipes.



DISCUSSION.

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Dr. Divers, in emphasising some of the points brought out in the paper, took occasion to draw the attention of members to the great practical importance of accurate chemical analysis. Much of the analysis which the paper contained had been done by Japanese students under Mr. Korschelt's direction.

The Chairman, in conveying the thanks of the Society to the author, remarked that the importance of the subject, technical though in many respects it was, was fully attested by the large audience which had gathered to hear the papers.

ON CHINESE LEXICOGRAPHY, WITH PROPOSALS FOR  
A NEW ARRANGEMENT OF THE CHARACTERS  
OF THAT LANGUAGE.

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BY REV. J. SUMMERS.

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[*Read January 23, 1884.*]

The members of this Society are all acquainted more or less with the difficulties which surround the study of Chinese, whether in this country or in China itself; and some of our associates are more intimately cognizant of these difficulties. Yet I may perhaps be allowed to offer a few brief remarks explanatory of the subject for the benefit of those needing such, and I will beg you, Mr. President, and such as have a full knowledge of the matter, to bear with me while I run over the history of the Chinese language as a preliminary to what I have to propose concerning a new arrangement of its symbols.

Premising then that the Chinese *written* language or rather *written characters* dates some 2,000 years before the Christian era, and therefore in point of antiquity is to be classed with the sacred language of the bible, the hieroglyphics of Egypt, the cuneiform writing of Assyria, and the earliest forms of written languages in India, we may put it down as one of the few primitive languages of mankind.

Chinese differs, however, from these in extent, for while the Hebrew presents to us little more of that language than that which is extant in the sacred volume; and the Egyptian only a limited and fragmentary mass of literary remains in characters often still hard to decipher; while the Assyrian can enlighten us but dimly with its storehouses of books of stone and hardened clay, scarcely accessible and certainly not very

voluminous ; and the Sanskrit indeed can offer for our investigation heaps of manuscripts and inscriptions on stone or metal, as the ancient title-deeds on copper and the inscriptions of Açoka ; the Chinese have an unbroken line of documents, inscriptions on metal vases, on stone monuments and in printed books immeasurably greater than the literary stores of these other primitive tongues. Commencing with the very rudest forms cut in stone or graven on metal, the Chinese have, from age to age, added to, changed the shape of, and otherwise modified the strange symbols which have come down to us, and which exist at the present day a monument of literary skill and effort, and are objects of veneration to the largest family of mankind. Wherever the Chinese language is spoken, and the influence of Chinese authority is felt, these ancient symbols have an almost magic influence. He who knows how to write and read them is at once pronounced a being of superior intelligence, and belonging to a higher scale than that of ordinary mortals. These characters, having been the vehicle by which the wisdom of the ancient sages, the treasures of antiquity and the history of primeval ages have been communicated to modern times, have acquired a sort of sanctity and a force which no other written characters possess. For though the *Dera-nāgarī*, "The divine writing," that is the Sanskrit character, is also revered through all the countries of the East, it lacks the picturesque aspect of the Chinese, and the Sanskrit language speaks more to the ear than to the eye.

The regularity of the Sanskrit forms charms indeed the eye and the compounded forms mystify the ignorant natives, but the Chinese astonishes by its complexity and pleases by its beauty even the illiterate. These symbols are the representations of much that is noble and pure and good, and each character has a history of its own, besides the history of its outward form. The latter in some of its original forms may be very interesting and very appropriate in our view, but they may be wanting sadly to express what we think they ought to express, because they have not largely entered into the past life of the nation and have no significant place in its history.

In ethical philosophy and national history the Chinese have striven hard to excel and not without success ; but their poetry belongs to the lower kind, description of natural scenery ; close analysis of mental

states and feelings are beyond the range of their imagination. The lines laid down by the old philosophers have been implicitly followed in the true conservative spirit, and writers in all ages have never been wearied of harping on the same elementary, (or shall I say fundamental), virtues ; *Jen* 仁 (*jīn*)<sup>1</sup> *Benevolence* (Love, Charity)—*I* 義 (*gi*) *Justice* (Righteousness), *Li* 禮 (*rei*) *Propriety of Conduct*, *Chi* 智 (*chi*) *Prudence* (wisdom), *Sin* 信 (*shin*) *Sincerity*, (Fidelity). On these of course many moral sermons might be preached without exhausting their meaning. Every such expression has indeed in Chinese a double sense, a two-fold interpretation, a subjective as well as objective force. The benevolence here meant is that of the heart as well as the outward act of charity ; the righteousness consists not merely in doing the right, but thinking and feeling the right thing ; the prudence is that arising from wisdom, and in “getting understanding,” and the sincerity is displayed not merely by fidelity to a master, but truth in the inmost parts. To sum up : this quincunx of virtues is topped by propriety of conduct, which means not only external forms of etiquette and decorum, but real humility, and this gives a religious phase to the whole.

Such then are some of the characters in Chinese which have a power in these twin nations ; they need to be studied, and their true significance to be drawn out. The christian missionary can throw a light upon their meaning, and it will be acceptable, because the words have already a genial sound to the ear which no other newly invented terms or paraphrastic expressions can have. But I must proceed to explain somewhat in detail the process of development which the Chinese written symbols have undergone and the principles on which their number has been increased.

The characters have been divided by Chinese paleographers into six classes, which they have called the *Luh shu* 六書 or the six forms of writing, viz.:

I. *Siang-hing* (*shū-kei*) 象行. Figures or shapes of simple objects in the natural world, as the sun, the moon, a mountain, a tree. Here are the ancient and modern forms :—

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<sup>1</sup>The Japanese pronunciation is in parentheses.

☉	☾	山	木	子	馬
日	月	山	木	子	馬
sun,	moon,	mountain,	tree,	son,	horse.

II. *Hwui-i* (*kai-i*) 會意. Associated ideas, or combinations of symbols to produce a new idea as 明 林 見 坐  
the modern forms of which are 明 林 見 坐  
which signify brightness, forest, see, sit.

III. *Chi-sz* (*shi-jì*) 事指 Things indicated, as by position, number, etc., as above, below, middle, one, two, three, etc.

二	一	中	一	二	三	☉	the modern
上	下	中	一	二	三	旦	which
signify	above,	below,	middle,	one,	two	three,	the dawn.

IV. *Ch'uen-chü* (*ten-chu*) 轉註. Forms inverted to represent new notions, as left hand, right hand, a man standing, a man lying (a corpse) thus, 左 右 人 尸  
The modern forms being 左 右 人 尸  
which signify left hand, right hand, man, corpse.

V. *Kia-tsié* (*ka-shaku*) 假借. Borrowed or metaphorical figures, in which class the *heart* stands for the *mind*; a *hall* for a *woman*.

心	囹	世	古
心	囹	世	古
Modern forms	心	囹	世
which signify	heart,	imprison,	an age,
			ancient.

VI. *Hing-shing* (*kai-sei*) 形聲. Figures representing sound, or phonetic symbols, which are the most productive of new characters, as will be seen in the explanation below.

This sixth class is by far the most numerous and prolific; in fact it is to this principle of formation that the Chinese language owes its extent, and by which new characters may be constructed *ad libitum*. By a series of characters, ordinarily 24 in number, and which serve as classifying elements signifying simple ideas, like the Egyptian Determinatives, and the use of other elementary characters, which are commonly phonetic, and numbering some eleven hundred characters, the mass of Chinese symbols has been built up.

As an example of this mode of construction, below are given some of the elementary forms with the derivatives therefrom.

1. 方 *fang* (hò) a square or angular piece of land, etc.
2. 訪 *fang* (hò) to investigate, to ask advice.
3. 房 *fang* (hò) a room, a chamber, an office.
4. 坊 *fang* (hò) a lane, a lodging, a hamlet, quarters.
5. 防 *fang* (hò) a bank, a dyke ; to ward off, to guard.
6. 彷彿 *fang* (hò) resembling, indistinct.
7. 紡 *fang* (hò) to spin, to reel, to coil or twist.
8. 共 *kung* (kiyô) together, with, all, to sum up.
9. 洪 *kung* (kô) a flood ; vast ; a torrent.
10. 烘 *kung* (kô) a flame ; to roast ; to flash.
11. 龔 *kung* (kiyô) to present with, decorous, reverential.
12. 拱 *kung* (kiyô) to make a bow, with the hands together.
13. 庶 *shu* (sho) a multitude, all, near ; the whole.

This is a sub-order derived like the above from 𠂔, which itself is connected probably with 𠂔, hands folded together.

14. 至 *chi* (shì) to come or go, to reach, to arrive at, superlative.
15. 致 *chi* (chi) to regulate, an aim, tending to.
16. 室 *shih* (shitsu) a house, a place of rest.
17. 屋 *wuh* (oku) a room, a house, a shop.
18. 到 *tao* (dô) to arrive at, to attain to, complete.
19. 倒 *tao* (dô) to pass over, to fall.
20. 同 *t'ung* (dô) the same, to equalize.
21. 洞 *t'ung* (dô) a rapid current.
22. 恫 *t'ung* (dô) pain (of body or mind).
23. 筒 *t'ung* (dô) a tube or duct.
24. 捫 *t'ung* (dô) to lead, draw out.
25. 銅 *t'ung* (dô) copper.

From these lists it will easily be seen that the so-called radical forms have but little effect on the signification of the derivative forms, whereas the primitive has considerable force in almost every new character produced. For example *Fang* (1) has a general signification for *space*; *kung* (8) contains the general notion of *quantity*; *chi* (14) the

general notion of *going so as to reach an end*; *t'ung* (20) implies the idea of *equality*. More or less of this is to be seen all through Chinese, but it needs a thorough examination to make it clear.

(1) The most ancient form of writing was called the *Tadpole* 蝌蚪 form, being rude strokes and irregular lines, thick at one end and tapering off like the figure of the rudimentary frog. The Japanese call it *o tama jaku shi*. Among the earliest forms of the character is the inscription of Yu or *Ta-yu*, a sort of Chinese Noah, who cleared away the waters of a great flood in B.C. 2300, by making canals to carry away the water. An ancient copy of this inscription is in the great temple at Wuchang by Hankow.

(2) The so-called *Chuen shu* (*ten-sho*) 篆書 character form was much used after the time of Confucius cir. B.C. 550. It is found on seals and coins, especially on those of the Mongol or Yuen dynasty, and is common for seals in China and Japan.

(3) The *Li shu* (*rei sho*) 隸書 writing was invented in the Han dynasty in the 2nd century B.C. This was used chiefly for public documents and in public offices, and was intended to replace the *Chuen* or seal character, which was often difficult to decipher.

(4) The *Tsao-shu* (*sō-sho*) 草書 or *grass-writing*, an elegant modification of the more precise forms; in fact, a cursive writing in various degrees of abbreviation. This is very commonly used in epistolary correspondence, elegant prefaces to books and for decorative scrolls. In Japan it is more used than any other form, and presents great difficulties to the uninitiated. The true method of writing the Chinese characters in their full and correct form is the key to the decipherment of these grass-characters. It was invented in the Han dynasty and has been retained up to the present time in some or other of its fantastic forms.

(5) The *Hing-shu* (*gyō-sho*) 行書, so-called because the symbols flow smoothly from the pencil, in contradistinction to the angular forms (6) of the Sung dynasty, usually called the *Sung-pan* (*Sō-han*) or '*Sung-block*' printing. This is the usual character employed in printed books, while that is used in plain writing and special documents.

The attainment of a good hand-writing in the Hingshu character

and the Tsao-shu (cursive form) is the aim of every Chinese scholar ; but years of practice are requisite to acquire perfection in either. It is the business of the antiquarian or paleographer to decipher and use the other forms, and with these we have nothing more to do.

The plain written form (*gyō-sho*) is that with which mainly we are concerned. Its variation from the printed form is trifling and the difference can soon be acquired.

The Chinese language in its origin and development, as far at least as its written symbols are concerned, is almost unique ; for if we except the ancient Egyptian and some of the Assyrian tongues, which seem to have been constructed on plans as regards classification and phonetic development similar to the Chinese, this language is without a compeer. It is therefore fraught with special interest to all philologists, both on account of its preservation from high antiquity and the strange forms of its symbols, as well as for the extent of the area over which it is in constant use.

A language of more than 50,000 different symbols, expressive of separate ideas,—some pure hieroglyphs—others compounded ideographs—presents a prodigious mass of material for the lexicographer, especially when we consider that these symbols, variously pronounced in different parts of the empire, are capable of being combined with other symbols to form words of two, three, or four syllables, according to the number of characters used,—each being indeed a monosyllabic root or word in its crude form. One-third of these, say 15,000, being thus employed alone as monosyllables, but more frequently as syllabic parts of words to produce new terms in the dissyllabic or trisyllabic form, the number of distinct expressions in the Chinese tongue must be entirely beyond computation.

Although the characters of the Chinese are so numerous, it must not be supposed that each even of the primitives is a *root* in the sense in which we use that term in Europe ; the characters are mere symbols or signs ; they are capable of no modification, as the Greek roots or the Sanskrit roots are : there are no weak and strong vowels, for no elementary syllabic forms are present. The true roots of the language may indeed be expressed in syllables, and with Roman letters, just as in any other language, but when the characters are taken they stand for ideas, not sounds.



It is true that the primitive forms to which monosyllable-names have been attached give their names to many derived forms, and the radicals very rarely do so.

If any part of the character is to be taken as the root in one sense of that term, then the primitive and not the so-called radical may be so designated, for it is often phonetic and frequently determinative.

The first object of the lexicographer then appears in this case to be to arrange and classify these primary 15,000 or 20,000 symbols by some plan which will lead to the immediate discovery of the form. The classification must be a classification of *forms*, the syllables for which they stand being quite arbitrary and subject to change. If we arrange the characters by their syllabic equivalents, we must first know what each is called in some dialect of China ; and every student who uses such a lexicon must have such knowledge. The best dictionary extent of Chinese and a foreign language is that of Dr. Wells Williams. This is syllabic ; but he found it necessary to add an index on another plan ; that of arrangement under the 214 Determinative-radicals, or classifying elements according to signification ; this approaches the system of Dr. Roget in his Thesaurus of the English Language, in as much as it is an attempt to classify characters according to *idea*. But the Chinese plan (for this is native in its origin), is only a rude means of discovering the *forms*. The ideas of *motion*, *speech*, *plant-life*, *disease*, etc., represented by a determinative attached to the character serve as keys to its discovery in the index. The presence of this radical form in a certain position in the compounded character shows the class of object indicated by the compound. In regard to many thousands of characters this principle is effective in classification ; but it fails in the case of many in which the key is in an abnormal position, or where two or three radical forms are present, and the compilers of the Imperial Dictionary found it necessary to add a copious list of characters whose root-keys were difficult to discover.

Another method of classification in use among the Chinese is that similar to a rhyming dictionary, the characters being sought for by their exact sound and rhyme (*i.e.* syllable and tone). These are commonly designated *Tonic Dictionaries* ; they are, however, hard to use, because they take for granted a knowledge of the sound and tone, a knowledge

which only a few comparatively of the Chinese people, outside of the literary classes, possess. It is no uncommon thing for a Chinese,—not a *savant*—to be unable to say what *tone* a character should have, although he may pronounce it perfectly right himself.

LIST OF DICTIONARIES ON WHICH THE CHINESE RELY.

The most ancient Dictionary is the *Shuo-wan* (*Setsu-bun*) 說文 by 許慎 (*Kiyo-shin*) arranged under a 540 Radicals in A.D. 100.

The 玉篇 *Yuh-pien* (*Gyoku-hen*) under 542 Radicals in A. D. 530.

The 類篇 *Lai-pien* (*Rui-hen*) under 544 Radicals in the Sung Dynasty by *Sz-ma-kwong* 司馬光 (*Shi-ba-hō*).

The 六書本義 *Luh-shu-pán-i* (*Riku-sho-hon-gi*) under 360 Radicals in the Ming Dynasty.

The 字彙 *Tsz-wei* (*Ji-i*) under 214 Radicals.

正字通 *Ching-tsz-tung* (*Sei-ji-tsū*) and the 康熙字典 *Kang-hi-tsz-tien* (*Kō-ki-ji-ten*) both under 214 Radicals.

The 唐韻 *T'ang-yün* (*Tō-in*); the 七韻 *Tsih-yün* (*Shichi-in*); the 廣韻 *Kwang-yün* (*Kō-in*) in A. D. 620; the 集韻 *Tsih-yün* (*Shiu-in*) in A.D. 1170, and the 五音集韻 *Wu-yün-tsih-yün* (*Go-in-shiu-in*). These are all Tonic Dictionaries.

The next most ingenious arrangement of the characters is under the so-called “*primitives*,” called by the Japanese *tsukuri* or “added” part, *i.e.*, the part which remains when the radical is taken away. This method involves the classification under from 1000 to 1200 forms, and has the advantage of leading the enquirer to a knowledge, partial indeed, of the syllable which the character stands for.<sup>2</sup> Here again there is a defect, for many characters do not follow the leading of the primitive in sound; and then the primitive is not phonetic. Still I must say that this seems to me to be a very reasonable method, as it aims at indicating the sound-equivalent of a character; yet the arrangement of these *primitives* or *phonetics* (for they have received both these designa-

<sup>2</sup>“These characters are the most important of all, as they will supply the means of bringing order into the chaotic state of China lexicography by a liable system of Etymology,” v. article on Dr. Williams' Dictionary by W. P. Groeneveldt.—*China Review*, Vol. III. p. 241.

tions) is unscientific, the number of strokes in each merely being the guide, counted in a certain order, indeed, which is a saving point. The plan may be seen worked out in M. Callery's *Systema Phoneticum Scripturæ Sinicæ*, published in Macao in 1841. The system had been previously indicated by Dr. Marshman of Serampore in his *Clavis Sinica*, published in 1814.

The only arrangements of Chinese according to form that I have heard of are,—one, never published, by the late learned Dr. Edwin Norris, secretary of the Royal Asiatic Society, in which all the characters of *K'anghi's* (the imperial) dictionary had been cut out and arranged in volumes, on an arbitrary principle of selecting what was taken to be the 1st stroke in the formation of the character. It was purely mechanical, as Dr. Norris was unacquainted with the correct writing of Chinese; he had discovered the mistake when he showed it to me, and he had given it up as lost labour. The other, by Professor Wassilieff of St. Petersburg, who has succeeded in arranging the Chinese characters on a plan of his own, by which any character can be found with facility but on an arbitrary principle. The elementary forms which he lays down as starting points are 390 more or less in number, and the order in which these are entered is the prominence of certain lines and dots. He takes first the *horizontal* line when a base line; then the *vertical* line; then an *angular* form, then another *angular* form, and so on. Of these elementary strokes he has fifteen, which is too many; and the order of them is inconvenient. The work would, however, have been more useful had it been in any other language than the Russian. The title reads,—*Graficheskaya Sistema Kitaiskikh Ieroglifoff*—or Graphic System of the Chinese Hieroglyphs—published by lithgraphy at St. Petersburg, 1867.

Prof. Wassilieff's system is similar in some respects to the one I have now to propose. I believe that he was influenced in the beginning by Callery's work, as I certainly was. I began to wish for a rearrangement and adjustment of Callery's phonetics when I was a mere student in China in 1850. Fourteen years later I had the plan which I desire to lay before you sketched out: but I could not see my way to carrying out my method until within the last two years, when I commenced arranging 20,000 characters according to my original plan,

and although I cannot feel quite satisfied with every part of the actual work, I am convinced of the utility of the method and its suitability to the end in view, which is the rapid discovery of a character in the dictionary by a regular and scientific method.

I have made the usual and natural order of writing the strokes of which every character is composed the basis of my arrangement. There is one fixed order in which the strokes follow each other. If a dot 丶 appears at the top of a character it cannot be written last: that would be like writing backwards. There are certainly fantastic ways of writing characters, but these are exceptions, the result of personal idiosyncracies. Let the usual order be followed; it will soon be found to be the natural order and the most convenient besides. Those who do not know the proper sequence of strokes may by an hour's study make themselves acquainted with it. This will not only facilitate their use of the dictionary, but put them on a par with natives of China and Japan in this particular.

If we assume six primary or elementary strokes, and represent them by *a b c d e f*, then a character may begin with any one of them, and be followed by any one of them. Thus, *aa, abad, badcaf, abbad, acbd, abcd*, may occur, and a word may be spelled out as it were and so placed in its proper position in the dictionary accordingly. So, however numerous the characters may be, they can be at once classified, and being so classified can be at once turned out. The so-called radicals have first to be known, and the order of these six elementary strokes, and every character can then be reduced to its lowest term by eliminating the radical and taking the first stroke of the primitive, if a simple one, as the guide to the dictionary.

The elementary strokes of which all Chinese characters are made up are seven:

The *point*, 丶 which is variously modified into 丶 ㇀ ㇁ and ㇂; even, 一 a short horizontal line appears to represent it, such a line is accepted as its equivalent; *e.g.* the character 户 is written 尸 and 户.

(2) The *Horizontal line* 一, under which I include ㇃, a spear-pointed line.

(3) The *Perpendicular* line 丨, which will sometimes be represented by 丿 and ㇏, having hooks below.

(4) The *Sweep* to the left ㇏, which may be placed at different angles as ㇏ and ㇏.

(5) The *Hook* ㇏, which may appear under the forms ㇏ ㇏ ㇏.

(6) The *Crook* ㇏, which assumes the forms ㇏ ㇏ ㇏.

(7) The *Sweep* to the right ㇏, which in writing appears thus ㇏ and often as a mere dot ㇏.

Every Chinese character being formed of these strokes, it is important to enquire whether they are written in any fixed order, and to acquire the method of writing. Those who have watched the Chinese teachers writing will have observed with what regularity and precision each stroke follows the preceding one. For the benefit of those unacquainted with this order, I shall give a series of simple rules which will suffice to guide them at the outset, and the further study of the arrangement made in the dictionary will do the rest.

There are a few characters which are variously written by different scholars, some of whom purposely depart from the established custom. To allow these peculiarities to affect our system would be like varying the order or arrangement of a European dictionary to suit the vicious pronunciation of particular persons in Europe. I may be permitted therefore to show what the rules of Chinese writing are, and leave those to object who think they can do so.

#### RULES FOR WRITING CHINESE CHARACTERS.

1. If a dot or point appear at the top or on the left side of a character it is invariably to be taken *first*, as in the following: 宀 户 汜 宀 永 火 兆 米 卷 even when on the right in one instance 乚 but in 乚 and 飛 the crook 乙 comes first, some writers make the dots after the sweep in 兆 and this is properly done in the case of 疒, the radical for *disease*.

2. If a vertical line or a sweep crosses a horizontal line, the latter always is written first as in 十 末 皮 有; and if there be a horizontal line for the base it follows as in 土 主 在.

3. A horizontal line always precedes a vertical one whenever the latter is attached to it from below and does not cross it, but the reverse is the case when the horizontal forms the base.

4. The vertical line comes first when it appears on the left and is attached to the hook 丿 as the second stroke, as in 口 日 目 冂 門.

5. The sweep to the left follows rule (2) with regard to the horizontal; if it pass through or starts with the latter it comes second as in 在 有; if it stop on the horizontal it precedes it, as in 石 每. When appearing above or on the left hand the sweep comes first; but when joined to the hook or crossing it, the sweep comes second, excepting when added to the extreme end of the hook; compare these examples 禾 斤 戶 臼 刀 力 乃 勺 々. In the same way a sweep at the left hand of a horizontal precedes that line 生 圧 which latter, however, is more usually written with horizontal first.

It is not my intention to treat this point exhaustively here. I will merely show the order of strokes in a few characters by way of example:—

eternity	永 永	丿 <sub>1</sub> 丨 <sub>2</sub> ㇏ <sub>3</sub> ㇏ <sub>4</sub> ㇏ <sub>5</sub>	ancient	古	一 丿 丨 ㇏
clothing	衣	㇏ <sub>1</sub> 一 <sub>2</sub> 丨 <sub>3</sub> ㇏ <sub>4</sub> ㇏ <sub>5</sub> ㇏ <sub>6</sub>			
a minister	臣	一 <sub>1</sub> 丨 <sub>2</sub> ㇏ <sub>3</sub> 一 <sub>4</sub> 丨 <sub>5</sub> ㇏ <sub>6</sub>			
to fly	飛	㇏ <sub>1</sub> ㇏ <sub>2</sub> ㇏ <sub>3</sub> ㇏ <sub>4</sub> ㇏ <sub>5</sub> ㇏ <sub>6</sub> 丨 <sub>7</sub>			
a gateway	門	丨 <sub>1</sub> ㇏ <sub>2</sub> 一 <sub>3</sub> 一 <sub>4</sub> ㇏ <sub>5</sub> 一 <sub>6</sub> ㇏ <sub>7</sub>			
a heart	心	㇏ <sub>1</sub> ㇏ <sub>2</sub> ㇏ <sub>3</sub> ㇏ <sub>4</sub>			
to ascend	升	㇏ <sub>1</sub> 一 <sub>2</sub> 丨 <sub>3</sub> 丨 <sub>4</sub>			
to imprison	囚	丨 <sub>1</sub> ㇏ <sub>2</sub> ㇏ <sub>3</sub> ㇏ <sub>4</sub> 一 <sub>5</sub>			
I.	我	㇏ <sub>1</sub> 一 <sub>2</sub> 丨 <sub>3</sub> ㇏ <sub>4</sub> ㇏ <sub>5</sub> ㇏ <sub>6</sub> ㇏ <sub>7</sub>			

There is not one character which begins with ㇏ or ㇏ and therefore for our purpose these may be omitted or ignored in the arrangement in the dictionary.

The leading strokes then are the *dot*, the *horizontal*, the *perpendicular*, the *sweep*, the *hook* and the *crook*.

㇏ 一 丨 ㇏ ㇏ ㇏

As the elementary characters called Radicals, 214 in number, enter so largely into the composition of characters, we have considered

it advisable to assume that they are known by the student who is to make use of the dictionary, and so far to utilize them in our system. They are, however, arranged on the same plan and are found in their proper places in the dictionary.

That part of the character which is to lead to its discovery in the dictionary has been called the Root-key. In order to find the root-key the following rules have been laid down to be observed.

1. Let radical-forms be thrown out; but if the whole character consist only of radical forms, then that on the right or below is to be accepted, and this will be found in the dictionary under the stroke with which it begins.

2. If one of the Radicals is the root-key and is of a complicated form, it is subject to analysis, *e.g.* 𠂔 will come under 丿 and 彡; 𠂔 being a radical, 𠂔 in another form.

3. The reduplication of a form constitutes it the Root-key. Two 女 women or two trees 林 or two 口 mouths come respectively under 女, 木 and 口.

4. The enclosed portion is generally the Root-key.

If we take A. B. C. D. as Radical forms and X. Y. Z. as the non-radical and unknown quantities, the following forms will serve to explain more clearly.

Let 

A	B
C	D

 be a character. Then look for it under D

“ 

A
B
C

 “ “ “ “ “ “ C

“ 

A
B

 “ “ “ “ “ “ B

“ 

A	B
C	

 “ “ “ “ “ “ B

“ 

A	B
X	
C	D

 “ “ “ “ “ “ X

“ 

A	B
C	
D	E

 “ “ “ “ “ “ C

“ 

B	A	D
---	---	---

 “ “ “ “ “ “ D

It will be seen that the plan I propose does away with the necessity of first discriminating the radical and then of counting the

strokes of the primitive, as on the old system. The two things required to be known are: the radicals *by sight*, and to understand the simple rules given above for writing any character.

It devolves upon me now to show the advantages that accrue from following this method.

In the first place time in searching for a Chinese character in the dictionary will be saved, the first stroke of the root-key being at once seen, while by the old system the radical is not always apparent, and when recognized, the strokes (from 2 to 20) of the primitive must be counted, then the character is to be sought among twenty or thirty others. (2) The Root-key is generally phonetic, and it will be found associated with characters which bear a like signification, thus constituting a logical method, the determinative or Radical being superadded. This latter appears to classify without really doing so, for except in a few cases in which the Radical *e. g. tree*, distinguishes the general class *trees* under their various names, and the Radical *plant* does likewise so with names of plants, and Radical *mountain*, with all hills etc, there is not so much of the character's meaning to be derived from the Radical as there is from the primitive, as Dr. Marshman shewed there is a general meaning also attached to the primitive which runs through the whole, even when the different radicals are added. It will also be found that there is a frequent interchange of characters having the same primitive, the radical being overlooked.

In conclusion I would crave the indulgence of the members of this Society if I have failed to make clear some points in this essay to explain a most difficult subject, and I will beg of those who are inclined to differ from me to reserve their judgment until they have an opportunity of testing the plan in its complete form.<sup>1</sup>

The value of a lexicon is greatly enhanced by the facility it offers for reference. The words of strange languages slip out of the memory so

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<sup>1</sup>A dictionary upon this plan containing some 10,000 characters is nearly ready for printing, and will be sent to press as soon as sufficient encouragement to do so is forthcoming. It contains an exhaustive list of equivalents from Japanese dictionaries, with the synonymous and explanatory characters required under each word. It will be a compact Hand-Lexicon of Chinese for English, Chinese and Japanese students.



easily that nothing is so much to be desired as a dictionary easy to refer to without loss of time. In Chinese this is the more expedient, because the language is so vast, and up to the present the dictionaries are so imperfect, that the student wants not only to see the word again and again, but often desires to add his own quota to its imperfections.

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DISCUSSION.

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A very animated discussion followed, largely interspersed with questions upon special points which had not appeared sufficiently clear during the reading of the paper.

The Rev. Mr. Gring doubted if, after all, the system would be of such superiority as its author thought, as it also seemed to require the learning by heart of the 214 radicals.

The Chairman, in criticism of certain remarks of Mr. Gring's, pointed out that a dictionary was valuable because it contained the uncommon words, and that in any process of abridgment the ordinary words which every one knew should be the first to be sacrificed. He felt it would be premature to enter into any detailed criticism of the plan which the Rev. Mr. Summers had laid before them. The best test would be the practical test; and he would reserve his judgment until the new dictionary was published and in his hands.

THE CHEMISTRY OF JAPANESE LACQUER.<sup>1</sup>


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 BY O. KORSCHOLT AND H. YOSHIDA.
 

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[Read February 13th, 1884.]

The Japanese lacquer is the sap of the lacquer tree (*Rhus vernicifera*) and is obtained by making incisions in the stem and branches of the young tree, the lacquer then flowing out as a viscous greyish liquid. The processes of collecting and purifying the raw lacquer and making it fit for use, as well as the very numerous ways of preparing the different kinds of lacquer-ware, have been described with more or less detail by several authors. The first writer on the subject in a European language was M. Paul Ory, who published a brochure on the *arbre-à-lacque* in Paris, 1875; this, however, we have not seen. Other descriptions of the lacquer-industry were given by the Japanese Commissioners to the International Exhibitions of Philadelphia and Paris. Mr. S. Ishimatsu, now called S. Hiraga, wrote, in 1877, a manuscript essay now in the library of the Tôkiô University; this is remarkable as the first account of the chemistry of the Japanese lacquer; it also contains a short description of the manner in which raw lacquer is collected. Very detailed accounts of the Japanese lacquer-industry have been given by Prof. Rein in the "*Oesterreichische Monatsschrift für den Orient*, 1882, Nos. 4-7, and by Mr. Quin, formerly British Consul at Hakodate, in a report to his government. It appears to us, however, that these publications have not exhausted their subject, and that still much new

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<sup>1</sup>A preliminary note on the same subject was given in September 1883, by one of us in the German Asiatic Society, by the other in the Chemical Society of Japan.

and valuable information on the making of lacquer-ware might be collected by direct enquiries in the work-shops. Until now we have directed our attention only to the explanation of the chemical processes applied in making lacquer-ware, but we hope to be able at some future time to continue our investigations in the work-shops and in connection with the workers, feeling sure that the methods of working may be improved in some way by the scientific basis we have given to this extremely interesting industry.

The lacquer-tree is cultivated all over the country, but especially in the northern and middle provinces of the main island between 33° and 37° latitude. The provinces where most of the lacquer is produced are Dewa, Oshiu, Aidzu, Echigo, Sagami, Suruga and Aki, but the best lacquer comes from the district round Yoshino in Yamato, that from Aidzu being also celebrated. Only the young trees furnish the good lacquer; from the old trees only very little lacquer is obtained, which is besides of an inferior quality. It may be mentioned that the berries of the old lacquer-trees furnish, when crushed and steamed, Japanese wax, although most of this is got from *Rhus succedanea*, a tree which very much resembles the lacquer-tree.

The trees are tapped when 5 to 10 years old and 9 to 12 feet high; afterwards they are cut down.

Three kinds of juice are obtained by different processes. They are distinguished as *Ki-urushi* (raw lacquer), *Seshime-urushi* (*seshime* is a technical expression, the meaning of which is unknown) and *Moku-yeki* (wood-juice). *Ki-urushi* is the best quality, which exudes in drops from the incisions made into the stem between the outer and inner bark. If the best lacquer is wanted, the trees are allowed to rest one year and are tapped only every second year. They may be tapped every year, but then the quality of the lacquer gets inferior. The iron or bamboo spatulas used in collecting the juice are well oiled, else it would be impossible to transfer the juice from them to the collecting vessel without great loss. In consequence of the small yield of lacquer from one tree, the trees are not planted on ground which could be used for anything else. The trees are found on the borders of the fields, on the hill-sides, etc., just as the mulberry-trees in the silk-districts, although the latter are also sometimes found on arable land.

The *Seshime-urushi* is got from the branches and twigs of the trees, which are cut off and steeped in water for several months. After having been soaked during this time, they are slightly warmed by laying them near the fire, and the *Seshime-urushi* then exudes from the incisions made and from the ends. This lacquer is always of inferior quality and of harder consistence than the *Ki-urushi*, and is applied only for priming the lacquer ware.

*Moku-yeki* is a very inferior kind of lacquer, but we have not been able to ascertain how it is obtained. We have been informed that the *Ki-urushi*, before being sent to market, is always mixed with a certain quantity of *Moku-yeki*, so the ordinary *Yoshino-urushi* contains 40 % *Moku-yeki*, while the inferior *Yoshino-urushi* contains as much as 70 %. A certain quantity of *Moku-yeki* must consequently be got from each tree besides the *Ki-urushi*.

Between the farmers who produce the raw lacquer and the lacquer-makers, there is a class of merchants in whose hands the raw lacquer undergoes a preparatory treatment to make it fit for the use of the lacquer-makers. This treatment consists (1) in a filtering of the raw lacquer through cotton-cloth and afterwards through a very thin paper, called *Yoshino-gami*, to remove bark-dust and other impurities; (2) in stirring the lacquer in a large shallow wooden pan in the sunshine. The pan stands inclined and the lacquer stirred up flows back in a thin layer over the nearly plain bottom of the pan. By this treatment the lacquer assumes a dark brown color and loses in volume. The latter the workers ascribe to the evaporation of water from the raw lacquer, in which opinion, as will be seen afterwards, they are quite right. It is an experience of the lacquer-makers, that, if this stirring is continued too long a time, the drying of the lacquer afterwards becomes very slow, a fact we shall be able to explain later on in this paper.

All the lacquer is subjected to this preliminary treatment. The greater part of the lacquer is now mixed with a certain quantity of a drying oil, called *Ye no abura*. This quantity varies according to the kind of varnish it is intended for, but is never more than 20 %. *Ye no abura* is the oil of *Terilla ocimoides*, and is used largely in making water-proof paper for umbrellas, rain-coats, etc. Its drying qualities are excellent. Those kinds of coloured lacquer, which are much used by

the lacquer-makers, are also prepared by the merchants. Vermilion, indigo, orpiment, lamp-black and iron salts are mostly used to impart the different colors. The iron salts are either ferrous sulphate or the so-called *ohaguro*, tooth-black, which is made by allowing iron to rust in vinegar or *sake*, and which is consequently acetate of iron. These iron-salts are incorporated with the lacquer by stirring both together in the above-mentioned pan, whereby the water of solution is removed. The iron-salts give to the lacquer a dark brown colour called *ro-iro*; vermilion gives red. These two colours are the most used, as they best agree with the natural dark brown colour of the lacquer. Indigo alone does not make the lacquer blue, when added in such quantity only, that the lacquer still will harden. Besides red and black lacquer, green and yellow lacquer is made, the first by adding a mixture of orpiment and indigo, the latter by orpiment alone. Ultramarine, the aniline colours, different oxides and colours of vegetable origin, if mixed with lacquer, do not impart to it their own colour, but give it only a dirty appearance. Ultramarine is decomposed by lacquer developing sulphureted hydrogen.

#### CONSTITUENTS OF THE LACQUER.

The filtered raw lacquer is a grey and very viscous liquid which cannot be poured from one vessel to another without much remaining on the side of the former. It has a characteristic sweet odour. Under the microscope (magnifying power 7-800) it appears to consist of very minute globules. There are larger globules which have a light colour mixed with smaller globules, and dark in colour. The latter are much more numerous than the former. Between them opaque brown matter is irregularly distributed in shreds and lines.

The raw lacquer is consequently an *emulsion* of two substances, with which is mixed a third.

The specific gravity of filtered raw lacquer is 1.0020 at 15° compared with water of the same temperature. This determination was made with Yoshino-lacquer, which is the best kind. The raw lacquer, as obtained from the tree, has a little higher specific gravity owing to the particles of bark and dust it contains. An unfiltered sample of raw lacquer from Hachioji in the province of Sagami gave 1.0379.

The raw lacquer is for the most part soluble in absolute alcohol, ether, carbon disulphide, benzene, petroleum, chloroform and amyl-alcohol. It dissolves about equally well in all, with the exception of amyl-alcohol, which is less active, but the best solvent is absolute alcohol. With the other solvents the insoluble residue remains in the state of emulsion, which makes the extraction of the last portion of soluble matter tedious, while absolute alcohol destroys the emulsion by taking up the water and gives to the residue the appearance of a heavy precipitate, which easily settles and can be well extracted. If the alcohol used is not quite absolute, the solutions obtained by decanting or filtering are more or less cloudy; in the same way some drops of water added to an alcoholic solution make the latter cloudy. It seems that the substance soluble in alcohol returns at once to the former state of emulsion when it meets water. If the raw lacquer has been treated about ten times with alcohol, each time thirty times its volume of alcohol being used and filtered off, it is completely exhausted. If the extraction with alcohol is done in the cold, there is always some hardening taking place, a thin black line being formed on the beaker along the surface of the alcohol. This hardened lacquer mixing with the residue makes it impure. By heating the raw lacquer on the water-bath before the extraction, or by using hot alcohol at the first extraction, this difficulty is entirely overcome, no line of hardened lacquer appearing then. On evaporating the alcoholic solution, at last on the water-bath, a dark brown syrupy liquid remains behind, amounting to between 60 and 80 % of the original lacquer. This liquid, which is entirely insoluble in water, as well as its alcoholic solution, reddens litmus-paper strongly and gives precipitates, if aqueous, or alcoholic solutions of metallic salts are added to its alcoholic solutions. It is consequently an acid and a rather strong one, as it decomposes even nitrates and chlorides. We call this acid URUSHIC ACID. Its combustion gave the following numbers.

CALCULATED FOR					
	I.	II.	Mean	$C_{14}H_{18}O_2$	$C_{14}H_{19}O_2$
Carbon	=77.09	77.01	77.05	77.07	76.71
Hydrogen	= 8.75	9.28	9.02	8.26	8.68
Oxygen	=14.16	13.71	13.93	14.68	14.61

The numbers for hydrogen do not agree well with either of the two formulæ which express best the results of the analyses, but the numbers observed for carbon correspond so well with the formula  $C_{14}H_{18}O_2$ , that this is the most probable composition of the Urushic Acid.

The residue, insoluble in alcohol, the colour of which differed, being in some cases grey, in others brown, partly dissolves, if treated with hot or cold water, leaving a residue which was invariably of a brown colour. The solution evaporated on the water-bath leaves a substance exactly corresponding in appearance to gum-arabic. Its solution foams strongly when boiled, and its adhesive power is very great and like that of a solution of gum-arabic. The combustion of it gave:—

Carbon	=40.51%
Hydrogen	= 5.98
Ash	= 5.06

The composition of the ash was the following:—

Carbon	=40.51 %
Silica	= 0.48
Alumina	= 7.85
Iron oxide	—
Lime	=44.77
Magnesia	= 5.79
Potash	=13.68
Soda	= 1.33
Carbon dioxide (by difference)	=26.10
	<hr/>
	100.00

If the hydrogen which is substituted by the bases, is calculated and added to the hydrogen found, and if the numbers for carbon and hydrogen are recalculated to 100, the composition of the gum free of ash is obtained as:—

CALCULATED FOR	
$C_{12}H_{22}O_{11}$ , Arabic Acid.	
Carbon	=42.47      42.11
Hydrogen	= 6.40      6.43
Oxygen	=51.13      51.46
	<hr/>
100.00	100.00

The numbers calculated and observed agree exactly.

The ash of gum-arabic consists mainly of lime and potash, the ash of the gum in the lacquer does the same, but it contains besides a considerable quantity of alumina, which however cannot be taken as an essential difference.

After boiling the gum for 30 minutes with 10 % hydrochloric acid, its reducing power was tested with Fehling's solution. Several preliminary experiments were made to ascertain the conditions under which the greatest quantity of sugar was formed from the gum. Sulphuric acid was found to be very liable to destroy the sugar which it had previously formed, and the above stated conditions gave the highest weights for the reduced Copper-oxide. 0.5 grs. gum, corresponding to 0.4747 grs. gum, in which the bases are substituted by hydrogen, gave 0.8050 and 0.8114 grs. CuO, the mean being 0.8082 grs. CuO. Supposing the sugar to have the composition  $C_6H_{12}O_6$ , one molecule of it reduces 3.67 molecules CuO. Arabinose, the sugar obtained from gum-arabic and metapectic acid reduces, according to Scheibler (Deutsche Chem. Ber. 1868, p. 108 and 1873, p. 612) 5.5 molecules CuO. It seems, therefore, that we have here a new kind of sugar, the reducing power of which is exactly two-thirds of that of arabinose. We are at present occupied in preparing this sugar, the name of which would be *urushinose* in the pure state, in order to study its properties.

We supposed that the residue remaining after the extraction of the gum would consist mainly of cellulose. We therefore treated it with aqueous Copper-oxide-ammonia, but the solution gave on addition of acids only a very slight, white and flocculent precipitate, almost nothing in fact. Cellulose was consequently not present. The residue, however, gave the reactions of nitrogen strongly and contained sulphur and phosphorus in traces. It consequently seemed to be an albumenoid body, but was entirely insoluble in every solvent we tried, when the gum was extracted by boiling water. If we dissolved the gum with cold water to avoid coagulation of the albumenoid, we could show that the latter was very slightly soluble in cold water and in dilute solutions of the alkali-hydrates, but not in weak acids. We therefore were not able to purify this substance, which certainly was impure from admixture of hardened lacquer, being always of a dark brown colour. The analysis of the residue gave :—



Carbon	= 63.44
Hydrogen	= 7.41
Nitrogen	= 4.01
Oxygen	= 22.94
Ash	= 1.20
Sulphur	= trace
Phosphorus	= trace
<hr/>	
	100.00

These numbers agree nearly with the formula  $C_{18}H_{25}O_5N$ . If we multiply this four times to give to it the number of carbon-atoms in Lieberkühn's albumin-formula, we get  $C_{72}H_{100}O_{20}N_4$ , while Lieberkühn gives  $C_{72}H_{112}N_{18}SO_{22}$  as the composition of albumin. It is difficult to believe that the residue should contain not so much as one-fourth albumin, and more likely that we have here a nitrogenous body with a much smaller percentage of nitrogen than albumin, but in its properties standing near the latter, since it is slightly soluble in water and alkalies and can be coagulated by heat like albumin.

The above sample was prepared without taking care to avoid partial drying of the juice while extracting it. When we took a juice which showed no signs of partial drying and which we heated on the water-bath before the extraction, we found that the nitrogenous residue had more nitrogen and less carbon, evidently because it contained less dried urushic acid than before, perhaps none at all.

	I.	II.	Mean.	Without ash.	$C_{72}H_{112}N_6O_{22}$	$C_{72}H_{110}N_6O_{24}$
Carbon	= 59.52	59.72	59.62	60.34	61.19	59.92
Hydrogen	= 7.62	lost	7.62	7.72	7.93	7.63
Nitrogen	= 5.48	...	5.48	5.55	5.95	5.83
Oxygen	= ...	...	26.08	26.39	24.93	26.63
Ash	= 1.20	...	1.20	...	...	...

Sulphur was present only as an indeterminable trace. The quantities were calculated for  $C_{72}H_{112}N_6O_{22}$ , which is Lieberkühn's Albumin-formula, but with only 6 nitrogen-atoms instead of its 18, and again for  $C_{72}H_{110}N_6O_{24}$ . The numbers observed do not agree with the former, differing in carbon 0.9 %, but they agree pretty well with the latter. Whether we have really here an albumin

with only one-third of the usual amount of nitrogen, a supposition for which no precedent exists, or whether this residue is a mixture, one-third of which is albumin and two-thirds a substance or a mixture of substances represented by the formula  $C_{18}H_{27}O_6$ , can only be decided by the study of the products of decomposition of the nitrogenous residue, and this we have not yet begun. That some other body is present in the residue besides the albumin, is, we believe, shown by the fact that the residue, if kept under water for weeks, gives out a fine characteristic smell similar to that of ether.

By distillation with or without addition of a little water on the water-bath, the raw lacquer gives off water having an acid reaction and upon which a thin film of oily consistency is floating. The quantity of acid contained in the distillate is very small. We got no precipitate with lead-salt, but mercuric-chloride was gradually reduced to metallic mercury, and with silver-solution reduction also took place.

The study of the raw lacquer has proved the existence of the following substances in it:

1. Urushic Acid.
2. Water.
3. Gum.
4. A nitrogenous substance.
5. A volatile acid, present in traces.

As the knives with which the raw lacquer is collected from the incisions of the tree are lubricated with a little of drying oil, to avoid the sticking of the lacquer to the metallic surface, some of the oil mixes with the lacquer. It is supposed by the workmen who do the collecting that the quantity of the oil is about 3 %. After exhausting the lacquer with cold alcohol, we could extract a small quantity of a brown oil with benzene or ether. It represented of course only a part of the oil which was present in the lacquer, as the cold alcohol slightly dissolves oil. All the specimens of lacquer we have examined contained more or less of the oil, and we found it in comparatively large quantity in those kinds which had already passed through the hands of the lacquer-preparers. We may therefore add as another substance, always present in the lacquer, although not contained in it originally,—

6. A drying oil, *Ye no abura*.

We analyzed all the different specimens of unadulterated lacquer which we could obtain. They had the following composition :

LOCALITIES.	1	2	3	4	5	6	7
	Yoshino, Yamato.	Hidachi, Hottamura.	Sagami, Southern district.	Echigo, Northern district.	Sagami, Hachioji.	Origin unknown, bought in Tokio.	Bought in Tokio.
Urushic Acid .....	85.15	64.62	68.83	66.92	80.00	64.07	58.24
Gum .....	3.15	5.56	5.02	4.75	4.69	6.05	6.32
Nitrog Substance.....	2.28	2.10	2.01	1.72	3.31	3.43	2.27
Oil .....	?	0.09	0.06	0.06	?	0.23	?
Water .....	9.42	27.63	24.08	26.55	12.00	26.22	33.17

The sample No. 1 is from the most famous lacquer district near Kiôto and is a specimen of the best kind of Japanese lacquer. It was collected in the presence and under the superintendence of government officers and then directly sent to Tôkiô to be examined. Its absolute purity is consequently guaranteed. The samples 2-5 were also obtained under specially favourable circumstances and directly from the producers. They were filtered in the laboratory and then analysed. Nos. 1 and 5 are *Ki-urushi* only, and no *moku-yeki* is mixed with them, while 2, 3 and 4 probably contain *moku-yeki*. Nos. 2-6 were analysed by Mr. T. Takayama. No. 7 is a specimen of an unprepared common lacquer, as it may be bought in Tôkiô. It was analysed by Mr. S. Hiraga, and the numbers were taken from his essay. No. 6 is a common lacquer, the water of which has been partly evaporated by stirring, it was blackened and ready for use. We may mention here that the best kinds of lacquer, as Nos. 1 and 5, do not undergo the preliminary treatment of stirring, because the amount of water in them is already sufficiently small.

The analyses show very strikingly that the main difference of good and bad lacquer lies in the quantities of urushic acid and water, the urushic acid being in the best kind of lacquer 80-85 %, in the middle kind about 66 % and in the worst below 60 %. The water shows an opposite relation: its quantity is smallest in the best kinds of lacquer and increases in the inferior qualities. It is about 10 % in the best lacquer, about 16 % in lacquer of middle quality and rises to 33 % in bad lacquer.

By stirring the bad lacquer in the evaporating pan, the water in it diminishes to about one-half, and its quantity is then as high as it is in lacquer of middle quality when it flows out of the tree. The stirring of the lacquer increases its viscosity very much, through partial hardening setting in, as seem to be shown by its blackening at the same time. While samples 2, 3 and 4 could be easily poured from one vessel to the other, this was nearly impossible with No. 6. Therefore the addition of a drying oil after evaporating the excess of water may not be only a means of making the lacquer cheaper, but its essential purpose seems to be to restore the lost, but necessary mobility.

#### THE HARDENING OF THE LACQUER.

The article which has received a brushing of a thin layer of lacquer upon it, is always put into a chamber, which is either a large wooden box, if some few articles only are made, or a well closed room, and then *kura* (fire-proof buildings) are generally preferred. In putting the articles coated with the drying lacquer into a closed and dark room, it is not the intention of the workers to exclude the light. They are aware that the lacquer, other conditions being the same, dries just as well in darkness as in diffused light or even in the sunshine. The latter, however, will be, we believe, injurious in two ways; first, raising the temperature of the hardening surface too much, and secondly, evaporating the water in the lacquer too quickly, in both cases retarding the drying. The direct sunshine is consequently injurious only by its secondary reactions, and to avoid these injurious influences the articles are not put in the open air to dry; besides this, the drying would go on slower on the side exposed to the wind, and lastly, dust would stick to the surface and make it unclean. It is the experience of the lacquer-makers that temperature and the humidity of the atmosphere have a decided influence on the time required by a layer of lacquer to dry. The season which is considered the most favourable one is the rainy season, at the beginning of summer, called *tsuyu*; then the temperature fluctuates between 20 and 27°, and the air is frequently saturated with moisture and has rarely less than 80 % humidity. The lacquer-makers know that it is always preferable to have a wet atmosphere, therefore in the dry season they hang up moistened cloth on the sides of the chamber

and put dishes filled with water in it. If the temperature rises over or falls below the most favourable temperature of 20-27°, the drying of the lacquer gets always slower and is entirely lost near the freezing-point, at least the lacquer-makers insist that in the winter months (end of December to end of February) the lacquer does not dry at all, even in moist atmosphere. In keeping the raw lacquer over winter, no precaution is taken to prevent its cooling down below the freezing-point, although the drying power is at that temperature entirely suspended; it reappears at once if the temperature is raised sufficiently. For this reason, the drying of lacquer is in the winter generally done, if done at all, in a *kura*, which is warmed with a charcoal-fire.

The temperature of the air rises in midsummer over the optimum of 20-27°, and then the drying power of the lacquer is greatly diminished. The highest temperature which the air gets in southern Japan, 36°, is considered to be highly injurious to the drying.

The experiences of the lacquer-makers, as given above, can be condensed into the following:

1. *A certain amount of moisture in the air is indispensable for the drying of the lacquer.*
2. *The drying of the lacquer goes on only inside of very narrow limits of temperature.*

These facts being known to us, it became now our object to solve the mystery of this process of drying the lacquer.

We first tried to find out which constituents of the lacquer take an active part in its hardening.

Urushic acid, obtained by evaporation of its alcoholic solution, was brushed in a thin layer on glass plates and kept in a moist atmosphere of favourable temperature. No hardening took place, but after several months the acid got resinous and hard and darkened in colour. This was, however, in many features quite a different process from the natural hardening of lacquer, and it was impossible to mistake it for the latter. Now we proceeded to try a mixture of the urushic acid with water. Both were intimately rubbed together in a mortar in the same proportion as in the raw lacquer, and the mixture was brushed on glass plates and brought into the moist chamber. The result was exactly the same as with urushic acid alone.

We now tried a mixture of urushic acid and of an aqueous solution of gum, applying the three substances in the same relative quantities as in the natural juice. Although care was taken to make a most intimate mixture, and although afterwards the proportions and conditions in the chamber were varied, we observed in no case a hardening. We also tried gum-arabic with the same negative result. After several months, again resinification set in in the manner described above.

The next mixture we made consisted of urushic acid and the nitrogenous residue from which the gum was separated by boiling water. No drying took place. Now we tried urushic acid, to which we had added the residue left behind when lacquer is treated with absolute alcohol, and which consists of the gum and the nitrogenous substance. This gave the desired result; the mixture hardened, and besides we observed that the time of hardening got shorter the more of the residue that was taken. When we took the same proportion of urushic acid and residue as the lacquer itself contained, the mixture required a longer time for drying than the original lacquer, which shows that the very intimate distribution of the gum and nitrogenous matter in the raw lacquer cannot be completely reproduced by rubbing the separated substances again together in the mortar. The residue was freed from alcohol by repeatedly pressing it between blotting paper, and then water was added in such a quantity that the mixture contained about as much as the raw lacquer.

When no water was added, the mixture of urushic acid and residue half wet by alcohol, did not harden and blacken at once. Both set in finally, but after a much longer time than that required when water was added to the mixture at once. Evidently the process of drying began only after the mixture had condensed water from the moist air of the chamber. There could be no injurious effect of the alcohol, as the latter was of course very soon completely evaporated from the thinly brushed layer. That water must be present in the lacquer or else its drying power is lost, is a very important observation. There are three ways in which the water may participate in making the urushic acid dry. First, by dissolving the nitrogenous body, which only in solution can act upon the urushic acid; second, by combining with the urushic acid, in the same way as certain nitrogenous bodies called diastase induce

starch to combine with half an atom of water and form maltose; and third, by acting in both ways at the same time. It is proved beyond doubt by the experiment in which a mixture of urushic acid and nitrogenous residue without addition of water hardened only after a considerable delay, that the water acts in the first way, namely as solvent; whether it also acts in the third way, will be seen later on. That the nitrogenous body loses its activity by treatment with boiling water, seems to be due to its coagulation. To prove this, we extracted the residue insoluble in alcohol with cold water until the gum apparently was extracted. The solutions of gum so obtained when boiled, gave a small quantity of an almost white flocculent precipitate, which shows that the nitrogenous body is slightly soluble in water and coagulates when its solution is boiled. It behaves consequently like albumin. When the nitrogenous body from which the gum was extracted as much as possible by cold water, was mixed with the urushic acid, hardening set in at once. We prepared a solution of this nitrogenous body also by shaking raw lacquer with one-half or one-third of its quantity of cold water. This water, which had got turbid, was filtered several times until it was quite clear. Urushic acid rubbed together with it and brushed in a thin layer, blackened and hardened at once, although perhaps not quite so quick as the raw lacquer would have done.

The result of these experiments is, that urushic acid, the nitrogenous body and water, are those constituents of the raw lacquer which play an active part in its hardening, the water acting as a solvent of the nitrogenous body. The presence of the gum in the juice is of no importance in regard to its hardening, but it seems to us that its presence prevents the other constituents separating from the emulsion in which they exist in the tree.

The next question we tried to solve was, to what temperature must the raw lacquer be heated to destroy its hardening power. We first convinced ourselves that the hardening power of the lacquer was destroyed by exposing it to the temperature of the water-bath. We made two series of experiments, the first with Yoshino-lacquer, the composition of which is given under No. 1, and the second with the lacquer No. 6, of unknown origin and bad quality.

The Yoshino-lacquer was placed in a small covered beaker and kept at a certain temperature for  $3\frac{1}{2}$ -4 hours in a water-bath which stood in another water-bath. Then the approximate quantity of water which had evaporated from the lacquer to the sides of the beaker and cover was re-added, and the lacquer brushed in a thin layer on glass-plates was put in a moist chamber of  $20^{\circ}$ , kept moist by dropping water.

1. The sample without heating dried after  $3\frac{1}{2}$  hours. The same under a bell-jar containing moist oxygen dried after less than 2 hours.

2. Heated to  $30^{\circ}$ , sample dried after 4 hours.

3. " "  $40-53^{\circ}$ , " " "  $4\frac{1}{2}$  "

4. " "  $50^{\circ}$ , " time not known.

5. " "  $55-59^{\circ}$ , " almost after 24 hours. The surface of the lacquer had a dull appearance.

6. Heated to  $60-63^{\circ}$ , sample did not dry.

7. " "  $80^{\circ}$ , " " " "

8. " "  $100^{\circ}$ , " " " "

The lacquer consequently loses its hardening power just at the temperature where albumin coagulates. This is a new and very strong proof that the nitrogenous body in the lacquer by its diastatic power causes the change of the urushic acid into another body which is solid.

The experiments with the lacquer No. 6, of inferior quality, were made by Mr. T. Takayama. He worked under somewhat differing circumstances, which complicated the results. He introduced the lacquer contained in a porcelain-boat into a glass-tube bent round and hanging in a kettle filled with water, which was heated to the desired temperature. In this way the lacquer could be kept more exactly at a certain temperature than formerly. While the sample not heated dried in 5 hours, the sample heated to  $60^{\circ}$  for 1 hour, dried in the same time only very thinly at the edges and the drying of the whole surface required more than 10 hours. The loss in weight of the lacquer through the heating was 7.5 %. Keeping the lacquer at  $65^{\circ}$  for 1 hour, the loss in weight was 10.3 % and 51 hours after being put in the moist chamber it was nearly, but not quite dry. The loss in weight at  $70^{\circ}$  was 11.8 %. This sample after 51 hours in the wet chamber had hardened only on the edges and was not yet fully dry after 100 hours.

The Yoshino-lacquer heated under the same circumstances at  $65^{\circ}$



for 1 hour lost 3.6% and did not dry afterwards. Different kinds of lacquer consequently seem to lose their active power at different temperatures. In those with a high amount of water, as lacquer No. 6, a very small portion of the nitrogenous body seems to escape coagulation, when the volatilized water remains as vapour in the atmosphere surrounding the lacquer, although the temperature may be several degrees over that of coagulation ( $63^{\circ}$ ). To try this supposition, Mr. Takayama repeated the experiments, but placed dry calcium chloride into the tubes to absorb the water as soon as volatilized from the lacquer. After heating the lacquer No. 6 in the dry atmosphere at  $65^{\circ}$  for 5 hours, it showed no sign of hardening afterwards, while the same lacquer heated under the same conditions in a moist atmosphere, showed signs of drying already in the tube, the edges getting hard.

We may consequently consider it as an established fact that every kind of lacquer loses its drying power when heated to the temperature of coagulation of albumin, if only opportunity is given to the water volatilizing from the lacquer to escape.

To give another proof that the nitrogenous body in the lacquer acts as a ferment on the urushic acid, we tried the effect of several substances on the lacquer which are known to coagulate albumin and to prevent the action of ferment.

We brushed the lacquer in thin layers on glass-plates, poured the solution of these substances over it and allowed it to run off after standing on the lacquer a very short time. In this way we tried phenol, potashferro- and ferricyanide, mercuric-chloride, copper-, lead-, and zinc-salts. The latter gave no decisive results and copper- and lead-salts produced precipitates on the surface of the lacquer which were the urushiates of these metals. Although the lacquer afterwards did not harden, on account of these bye-products the result was not clear. The effect of the other four substances was all we had expected. Potash-ferricyanide acted not so strongly as the others, which, poured once over the thin layer of lacquer, destroyed its hardening power entirely. It was interesting to observe that the lacquer, when its layer happened to be a little thick, hardened in the lower part, while the upper part remained liquid, because the reagents used had not penetrated the whole layer.

We now studied the question, whether the process of hardening is a simple hydration or whether oxygen must necessarily be present.

We brushed a weighed quantity of raw lacquer on slips of window-glass which were introduced into a glass-tube. A current of air was passed through one bottle containing potash-solution and two bottles containing sulphuric acid, and through a calcium chloride-tube, and was thus made completely dry. It now was made moist again by passing through a U-tube of known weight filled with wet pumice stone, and then passed over the lacquer, which quickly dried up, because care was taken to keep it at a temperature of 20-22°. Beyond the glass-tube there was a calcium chloride-tube of known weight which absorbed the moisture, and next to this a tube with soda-lime in order that we might see whether carbonic acid or any volatile acid is evolved from drying lacquer. When we considered the drying of the lacquer complete, we took out the tube of wet pumice-stone and heated the tube holding the lacquer to 100-120°, at the same time passing dry air through. In this way all the water remaining in the glass-tube was quickly carried over into the calcium chloride-tube. We made two experiments, with the following results:

	I.	II.
Weight of lacquer taken .....	0.5055	1.3278
Containing 17.61 % water .....	0.1395	0.3666
Water entering the glass-tube with the air	0.0220	0.0715
Total water .....	0.1615	0.4381
Water which left the glass-tube .....	0.1583	0.4210
Difference .....	0.0032	0.0171
This is in % of the Urushic Acid contained in		
the lacquer (Lacquer No. 2, p. 64.62 %).	0.98 %	1.99 %

If 1 molecule of urushic acid combines with 1 molecule of water, 8.26% water are required. In the first experiment there is only 1 molecule of water to 8.4 molecules urushic acid; in the second, 1 to 4.1 molecules. It is theoretically impossible that more than 2 molecules of the acid should combine with 1 molecule of water, and as the quantities of water not found again are so small as to fall, at least in the first analysis, within the limits of errors of experiment, we may safely conclude that *water is not taken up by the drying urushic acid.*

We have mentioned already that in moist oxygen the lacquer dries in half the time that it requires in moist air. This observation makes it very probable that *the drying of lacquer is a process of oxidation*. That indeed oxygen is absorbed by the hardening lacquer can be easily shown by spreading some lacquer over the inside of a bottle and inverting the latter in a pneumatic trough under water. The water then rises quickly and partly fills the bottle. The result is the same whether the bottle has been filled with oxygen or with air, only that in the former case the absorption is a much quicker one.

If the hardening of the lacquer consists in an absorption of oxygen, the lacquer would not harden in any other gas. To try this, we again brushed some raw lacquer in a thin layer over glass-plates and placed it under a bell-jar, which was afterwards filled with the gas. We used nitrogen, hydrogen, and carbonic acid in these experiments, at a temperature of 13-15°, with the result that, when the gases were dry, the lacquer never hardened, but when they were moist, the lacquer got hard in two days in carbonic acid and after 1½ days in nitrogen and hydrogen. This was a considerable delay, for the same lacquer had dried under the same circumstances in moist oxygen in 2½ hours and in moist air in 4 hours. Although we had taken the usual care to make the bell-jar tight, evidently some air had gradually entered and caused the lacquer to harden. It seems then that the lacquer is able to absorb oxygen even when this is in a state of high dilution, for this was surely the case in these experiments. We therefore made another series of experiments in which we used carbonic acid and hydrogen only, and in which we took every precaution to exclude oxygen altogether. Thus we succeeded in keeping the lacquer liquid in carbonic acid for 4 days and more. With hydrogen we had more difficulties, but at last were able to see the lacquer unchanged after standing in moist hydrogen for one month. This was done by allowing the hydrogen to stand over mercury.

It being thus positively settled that the lacquer absorbs oxygen while hardening, it was now our task to study the quantitative relations of this reaction. We found it impossible to determine the amount of oxygen absorbed by measuring its volume. To spread 1 gr. of lacquer in such a thin layer that it will dry in the course of one day, about

260 square cm. must be covered with it, supposing that the lacquer is brushed over a horizontal surface. If the layer is inclined or vertical, it must be much thinner still, as otherwise it flows downwards. We had therefore to use either such a small quantity of lacquer as to make the result necessarily inexact, or such large vessels as were not at our disposal. We therefore followed the indirect way of analysing the lacquer before and after drying. The Yoshino-lacquer was used in these experiments, because it was the purest sample. After the water had been expelled at the temperature of  $100^{\circ}$ , it had the following composition:

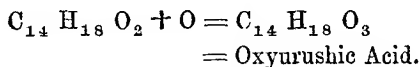
	I.	II.	Mean.	Calcul. from the constituents.
Carbon =	75.47	75.61	75.54	75.43
Hydrogen =	8.93	9.01	8.97	8.87
Nitrogen =	...	...	0.11	0.10
Ash =	...	...	0.21	0.21
Oxygen =	...	...	15.17	15.36

Having hardened in thin layers on glass-plates and been heated at  $100^{\circ}$  to expel the water, the lacquer gave on analysis the following numbers:

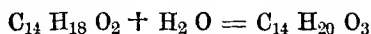
	I.	II.	Mean.	Calculated.
Carbon =	70.91	70.84	70.85	70.59
Hydrogen =	8.55	7.90	8.22	8.02
Nitrogen =	...	...	0.09	0.09
Ash =	...	...	0.32	0.19
Oxygen =	...	...	20.52	20.82

The calculation of the composition of the raw lacquer free from water was done by multiplying the quantities of the constituents found in Yoshino-lacquer according to its analysis, p. 191, by their composition, and increasing the products so as to make their sum 100. We thought it right to use the numbers obtained by the analysis of the urushic acid and not those calculated from the formula, and also used the numbers obtained by the first analysis of the nitrogenous residue with 63% carbon, because this analysis was made with a residue got from Yoshino-lacquer. The composition of the hardened lacquer free from water was calculated upon the supposition that one molecule of urushic acid had taken up one atom of oxygen, which gives a ratio of urushic acid to oxygen of 218:16 or 7.34%.

The numbers observed agree exceedingly well with those calculated in both cases. The first determination of hydrogen in the hardened lacquer is a little too high, and the same is true of the ash in the hardened lacquer, but this is of no importance whatever. The conclusion to be drawn from these analyses is that—*the hardening of the lacquer consists in the absorption of 1 atom oxygen by 1 molecule urushic acid.*



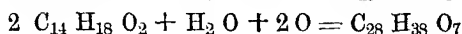
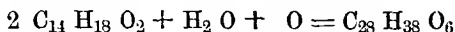
To give another proof that the hardening of the lacquer is not a hydration, we calculated the composition of the hardened lacquer under the supposition that the reaction might be expressed by the equation—



and obtained:—

	Calculated.	Observed.
Carbon	= 70.20	70.85
Hydrogen	= 9.02	8.22
Oxygen	= 20.66	20.52
Nitrogen	= 0.09	0.09
Ash	= 0.19	0.32

The difference in the calculated and observed numbers is so considerable that evidently no hydration had taken place. Other formulæ which might be suggested to explain the reaction are—



Of these the first and third are quite out of the question, as they give numbers which are still farther from the observed ones than those just given. The numbers calculated according to the second formula come nearer to the observed numbers, but they also do not agree at all so well with the observed numbers, as those calculated under the supposition of an oxidation only, which therefore can alone explain the experimental results.

The lacquer on drying evolves, besides the water, a certain, but very small quantity of volatile matter which can be absorbed by potash-lye and which seems to be carbonic acid. Its quantity was determined

in the above given two experiments, which were made to find out whether the process of drying of the lacquer is a hydration or not. We found the volatile matter amounting to

0.10 %

0.57

0.86

---

0.51 % Mean of the juice.

The third experiment was made with 1.5 gr. of juice. The quantity of volatile matter is consequently quite insignificant and far from being constant. We suppose therefore that it has its origin in a secondary reaction.

#### PREPARATION OF OXYURUSHIC ACID.

We tried to obtain oxyurushic acid first by purifying the dried lacquer. The raw lacquer was brushed in very thin layers on glass-plates, to ensure complete oxidation throughout its mass, and the dried lacquer, which was dark-brown and transparent, was scraped off and powdered. The powder was first boiled with absolute alcohol to remove the unchanged urushic acid, but in some cases nothing and in other cases very little was dissolved. We then boiled the dried lacquer with water, which was changed several times, and obtained the gum partly in solution. But it was impossible to extract the whole of it. Some quantity, less than one-half, remained in the lacquer, and although we afterwards boiled the lacquer with dilute sulphuric acid, the result was not much improved. As the nitrogenous residue would have offered still greater difficulties to removal, we abandoned the idea of obtaining oxyurushic acid by purifying dried lacquer, and endeavoured to obtain it by direct oxidation of the urushic acid. The following way proved successful.

A hot solution of chromic acid was made by dissolving potash bichromate to saturation, and sulphuric acid added in such excess that the mixture might remain acid after the formation of chrome-alum. The solution was allowed to cool and urushic acid added with continual stirring. The reaction sets in at once with considerable evolution of heat. The urushic acid floats on the solution, the upper layer of which begins to boil, and soon gets pasty. We renewed the chromic acid solution at least twice to make the reaction complete.

The urushic acid becomes more and more pasty and finally solid, at the same time assuming a brown colour. When the urushic acid had changed into a brown powder which sinks to the bottom of the vessel, the process was at an end and no more heat was evolved. After removing the chromic solution by decanting and filtering, the brown powder was boiled first with dilute sulphuric acid (1:30) to dissolve out the small quantity of chromic hydrate it contained, and afterwards with absolute alcohol to get rid of unchanged urushic acid. Of the latter only traces were found, and in some cases none.

Two different preparations were analysed.

*Preparation I.*

	1	2	Calculated for	
			Mean.	$C_{14}H_{19}O_3$
Carbon =	71.51	71.53	71.52	71.49
Hydrogen =	8.34	8.12	8.23	8.09
Oxygen =	20.15	20.35	20.25	20.43
C : H = 14 : 19.34				
C : O = 14 : 2.98				

*Preparation II.*

	1	2	Calculated for	
			Mean.	$C_{14}H_{18}O_3$
Carbon =	71.69	71.71	71.70	71.80
Hydrogen =	7.60	7.72	7.66	7.69
Oxygen =	20.71	20.57	20.64	20.51
C : H = 14 : 17.95				
C : O = 14 : 3.02				

It will be remembered that in the analysis of the urushic acid we got the numbers for hydrogen too high, thus making the observed number agree better with  $C_{14}H_{19}O_2$ , which is a very improbable formula, on account of its uneven number of hydrogen-atoms. The analysis of the first preparation of the oxynrushic acid gives the same result; the numbers observed agree very well with  $C_{14}H_{19}O_3$ . We therefore made the second preparation with special care, continuing the purifying processes much longer than we believed would be necessary. This had the expected result. The numbers observed agree exactly with those

calculated from  $C_{14}H_{18}O_3$ , which is therefore the composition of the oxyurushic acid, and at the same time prove that urushic acid has the composition  $C_{14}H_{18}O_2$ .

The oxyurushic acid retains a small quantity of chromic oxide, notwithstanding the prolonged boiling with dilute sulphuric acid, its quantity amounting to about 1.5 %, which in each analysis was separately determined and subtracted.

The oxyurushic acid is a substance of very peculiar properties, which are however rather of a negative character. It is entirely insoluble in every solvent we have tried. Alcohol, ether, carbon disulphide, benzene do not dissolve even a trace. Potash and sodic hydrate, as well as ammonia of any degree of concentration, either cold or boiling, have not the slightest influence upon it. Acids also do not act upon it. In boiling concentrated hydrochloric acid, and even in boiling concentrated sulphuric acid, the oxyurushic acid undergoes no perceptible change; strong nitric acid alone has any influence. Boiling concentrated nitric acid acts slowly upon it, but the action is quicker when fuming nitric acid is boiled with it. Then it changes into a yellow substance which gradually dissolves in the acid. Oxyurushic acid does not melt. It softens, when heated to somewhat over  $200^\circ$ , emitting at the same time a white smoke, and changes its colour to black.

We have in oxyurushic acid one of the most stable and indifferent of bodies. As dried lacquer consists for the most part of this acid, its resistant qualities will be imparted to a certain extent to the lacquer itself. The gum and nitrogenous body which the lacquer contains besides the oxyurushic acid are easily attacked by concentrated alkalies and acids, especially when they are hot. The power of the lacquer to resist the action of these substances will therefore be much less, although it is certainly much increased on the other hand by its smooth surface. In regard to solvents, lacquer will have the same resisting power as the oxyurushic acid itself, as gum and the nitrogenous body are both insoluble in alcohol, etc., and this is confirmed by the practical experience of European photographers, who use lacquer-dishes a great deal.

#### INFLUENCE OF WATER ON LACQUER.

But judging from what we now know of the constituents of dried



lacquer, we have a right to say that *water* must have an injurious influence on lacquer-ware. The gum which is contained in the lacquer swells up when laid in water, before it dissolves in it. Under certain conditions, if lacquer-ware is brought in contact with water, it may happen that the lacquer may rise in blisters caused by the swelling of the gum, and then when the lacquer gets dry again, will crumple, because the gum resumes its former small volume. European writers are silent upon this subject, but it is a fact well known in every Japanese household, that from the lacquer-dishes used at dinner every drop of water remaining on them after they have been washed, must be wiped away thoroughly, as else the phenomenon described above may appear under the drops. Lacquer-ware made of bad juice shows, as is well known in households, this behaviour much more readily than good lacquer. This can be very well understood from our analyses of lacquer-juice (p. 191), which show that bad juice has twice as much gum as good lacquer-juice, which relation increases in the dried lacquer to three times, on account of the difference of the amount of water in the juice.

The gum in the lacquer-ware very likely undergoes a gradual oxidation by the air and it is therefore probable that old lacquer, of 50 or 100 years or more, is not injured by water at all, the gum having disappeared or been altered by oxidation.

There is a way to diminish the gum in the raw juice and thus improve the qualities of the latter, and it is just possible that this process might be employed with advantage by the lacquer-workers. This process would consist in extracting raw juice with alcohol, evaporating the alcoholic solution of urushic acid and mixing the pure urushic acid thus obtained with raw juice in certain proportions. Common raw juice containing much more water than is necessary for its drying, it will be generally unnecessary to add water to the mixture to restore the former relation of urushic acid and water, unless for trading purposes. As the nitrogenous body according to our opinion acts as a ferment, the drying power of the juice will not suffer, although the quantity of the nitrogenous body should get much less. This of course will be true only to a certain limit, to find which we made several experiments. We mixed 1 part of the lacquer from Hitachi (No. 2, p. 191) with 1.33, 4.5

and 7.7 parts urushic acid and brushed the mixtures on glass-plates, which were put together in the same moist chamber, the temperature of which was only favourable in the day time, during night being not much over 0°. The mixture with 1.3 urushic acid and that with 4.5 did not show any marked difference; the first was dry early the second day, about as quick, as under these conditions the original juice would have become dry, and the second some hours later. Of the third mixture, with 7.7 urushic acid for 1 juice, some spots were dry on the third day and on the sixth day one side of the layer was dry, the other not. Consequently the limit to which the nitrogenous body may be brought down, was here about reached, and if the mixture of the urushic acid with the juice had been more intimate, the layer would have been probably semi-solid by that time.

These mixtures and the original juice have the following composition, free of water. The composition of the Yoshino-juice free of water, which contains the smallest amount of nitrogenous body, is added for comparison.

		Mixtures.				
				a	b	c
		Yoshino.	Hitachi.	1:1.3	1:4.5	1:7.7
Urushic acid	=	94.01	89.15	96.34	98.53	99.09
Gum	=	3.48	7.68	2.64	1.08	0.67
Nitrogenous body	=	2.52	2.90	1.02	0.39	0.24

This table is very instructive. It shows that we can make a lacquer-juice which dries nearly as well as the natural juice, although containing 7 times less nitrogenous body. The lowest amount to which the gum may be brought in the juice by addition of urushic acid is less than the 1.08% of mixture b. If the Yoshino-juice were diluted with urushic acid, until it contained 0.4% nitrogenous matter, it would have only 0.56% gum and consequently 99% urushic acid. Lacquer made with such a juice would withstand the action of water as effectually as old lacquer, and would also resist the influence of powerful reagents much better, as it would almost consist of oxyurushic acid only (99.1%).

Some other advantages will be connected with this method of enriching the juice with urushic acid. Lacquer prepared from such

juice shows a greater transparency and its surface a greater evenness and homogeneity, advantages which, together with that in regard to the gum, will, I believe, one day induce the lacquer-dealers to combine with their present methods of preparing the raw juice, that of enriching it in urushic acid.

#### ON THE URUSHIATES.

From the alcoholic solution of urushic acid many salts can be produced by adding alcoholic solutions of metallic salts. Aqueous solutions of the latter may also be used; they give after some shaking the same precipitates. Those of the below mentioned metallic salts which are soluble in alcohol, were invariably used in their alcoholic solution in order to be sure of having the urushiate pure.

Nitrate of silver gives a finely divided brown precipitate which is moderately soluble in alcohol. On boiling, the salt is reduced, depositing a mirror on the sides of the vessel. The silver urushiate is insoluble in water.

Platinic chloride gives a gelatinous black precipitate, somewhat soluble in alcohol. On standing, the precipitate sinks down and ultimately coheres to a pasty mass. Gold-chloride and acetate of uranium give very finely divided dark brown precipitates, which behave in a similar manner to the precipitate obtained by platinum-chloride.

Nitrate of copper imparts an intensely black colour to the alcoholic solution of the acid. If it be considerably diluted with water, the copper compound separates out in a most finely divided state.

Acetate of lead gives a grey flocculent precipitate, which is very characteristic of the urushic acid. It settles easily, and the supernatant liquid can be easily filtered off. In both respects it differs from the salts previously described, which in no case ever settle well and either run through the filter or are too pasty to be washed. We prepared a quantity of this salt by precipitating with an excess of lead acetate, filtering, washing with weak alcohol and then with well boiled water, drying first on a water-bath and finally over sulphuric acid in a desiccator, and then analysed it. The lead was estimated by moistening the salt with a little nitric acid, igniting and weighing as lead oxide.

			Mean.	Calc. for $(C_{11} H_{17} O_2)_2 Pb$
Carbon	=	52.12	52.12	52.42
Hydrogen	=	5.34	5.34	5.30
Lead	=	32.63	32.27	32.29
Oxygen	=		10.09	9.99

C : H = 14 : 17.21

C : O = 14 : 2.03

Pb : C = 1 : 27.7 (2 X 14)

This lead-salt is consequently the normal salt of urushic acid, which it also shows to be dibasic and of the formula  $C_{14} H_{15} O_2$ .

The lead urushiate is rather an unstable body. When kept for a long time at  $100^\circ$  in an air-bath, it gives out a peculiar odour and turns darker in colour. At  $120-125^\circ$  it melts to a dark brown mass, and at a little higher temperature it ignites spontaneously, burning with a smoky flame and leaving behind oxide of lead. Soluble salts of mercury, zinc, nickel, cobalt, manganese and all the earth-metals failed to give any distinctive reaction.

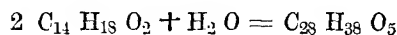
Free alkali imparts a very dark colour to the solution of the acid, which looks purplish blue by transmitted light and very deep brown by reflected light. If the urushic acid is added to an aqueous alkali solution, a black compound is formed, but it is difficult to say whether it is in the state of solution or of precipitate. It never settles, and makes the water in which it is half-suspended half-dissolved, very viscous. If filtered, most of it runs through the filter and a portion remains upon the filter, but continues to run through on washing. Put aside and left to evaporate spontaneously, a black and very lustrous film forms on the surface. By dissolving this film in light petroleum or benzol, in which it is to some extent soluble, a varnish of superior qualities is obtained. It gives a beautifully lustrous and deep black coating with a very smooth surface without cracks. The aqueous alkaline urushiate can be very well used as a writing ink, which in blackness surpasses any writing ink now in use. It can be only destroyed by strong hydrochloric acid, the written characters appearing even then in a light red colour, which can be made black again, however, although not so deeply as before, by neutralising the acid by alkali. On decomposing the aqueous alkali urushiate with strong hydrochloric acid, the black colour disap-

pears and a solution of dirty red colour is formed, from which, on standing or heating, a brown matter separates out on the surface very much like caoutchouc. A concentrated aqueous alkali-urushiate at once gives this caoutchouc-like matter on addition of hydrochloric acid. This peculiar substance when heated with strong hydrochloric acid on the water bath to fully extract the alkali, gradually blackens and hardens, losing at the same time its elasticity. At a certain stage of this process it much resembles cork, except in colour.

It has the following composition :

			Calculated for $C_{28} H_{38} O_5$ .
Carbon	=	73.97	74.01
Hydrogen	=	8.51	8.37
Oxygen	=	17.52	17.62
C: H = 28 : 38.66			
C: O = 28 : 4.98			

This substance seems to be formed from urushic acid according to the equation—



It is very sparingly soluble in alcohol and ether, and does not dissolve again in sodic hydrate solution.

#### ON FERRIC URUSHIATE.

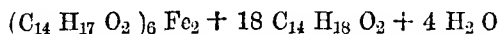
We have already mentioned that black lacquer is either produced by adding lampblack or by mixing some iron-salt with the lacquer-juice. In the latter case some iron-urushiate of a black colour is evidently formed, and we have therefore given special attention to the reactions between ferric oxide and urushic acid. Aqueous ferric chloride gives with alcoholic urushic acid a deep black voluminous precipitate, easily settling and sparingly soluble in alcohol, but almost insoluble in water. To see whether ferric urushiates of different composition might be obtained by a different way of precipitating them, we first poured into a great excess of urushic acid solution a small quantity of ferric chloride, and in another case we used a much larger amount of the latter. The two preparations showed no difference in appearance. They were

collected on filters, thoroughly washed with hot water, partially dried on the water-bath and then, still moist, put in a desiccator over sulphuric acid for several days.

*Ferric Urushiate No. I.*

	I.	II.	Mean.	Calculated.
Carbon	= 74.42	74.40	74.41	74.53
Hydrogen	= 8.18	8.14	8.16	8.02
Iron	= 2.07	...	2.07	2.07
Oxygen	= ...	...	15.36	15.38
C : H = 14 : 18.42				
C : O = 14 : 2.17				
Fe : C = 2 : 335.6 ( $14 \times 24 = 336$ )				

This salt is consequently very acid, 24 molecules of urushic acid being combined with 1 molecule of ferric oxide. The relations between carbon on one side and hydrogen and oxygen on the other show that there is more hydrogen and oxygen in the substance than the formula requires. The substance contains consequently water and the numbers calculated for



agree exactly with those observed.

*Ferric Urushiate No. II.*

	Observed.	Calculated for $(\text{C}_{41} \text{H}_{17} \text{O}_2)_6 \text{Fe}_2 + 6 \text{C}_{11} \text{H}_{18} \text{O}_2$
Carbon	= 74.56	74.06
Hydrogen	= 8.16	7.71
Iron	= 4.29	4.11
Oxygen	= 12.99	14.11

The numbers observed do not agree well with those calculated, but we cannot express the results of the analysis better by any other formula.

Both iron-salts are, in the dry state, very light and have a faint peculiar odour. They melt at about  $120^\circ$  to a black mass with some decomposition, and at a little higher temperature ignite spontaneously, giving out dense smoke of a disagreeable odour, without flame, sparks only running over the surface.

We made a third preparation with alcoholic ferric chloride, which we dried at 100-110° in the air-bath for 6-7 hours. On analysis it gave:

*Ferric Urushiato No. III.*

	1	2	Mean.
Carbon	= 71.80	71.55	71.68
Hydrogen	= 7.71	7.67	7.69
Iron	= 3.126	...	3.126
Oxygen	= ...	...	17.50

C : H = 14 : 18.02

C : O = 14 : 2.56

Fe : C = 1 : 107.1

These numbers lead to no definite formula, but they tend to show that oxidation took place while the substance was drying at 100°. The relation between carbon and hydrogen is not altered, and that between iron and carbon is also nearly the same as in the preparation No I. To see whether this very peculiar oxidation would again occur on exposing this ferric-urushiato to 100°, we spread 3.2386 gr. of it on the bottom of a flask, which we placed in boiling water. Air free from moisture and carbonic acid was passed over the substance in a slow current and into calcium-chloride-tubes and a Liebig's potash-bulb to absorb the water and the carbonic acid which might be produced by the oxidation. After continuing the treatment for 10 hours, the weight of the substance employed had increased 0.1034 gr. = 3.19 %.

and 0.3890 gr. = 12.01 % water and

0.0739 gr. = 2.28 % carbonic acid had been evolved.

That the increase of weight in the calcium-chloride-tubes was mainly due to water, there could be no doubt, because large drops of water could be seen in the neck of the flask soon after the heating had commenced, which collected finally in the bulb of the calcium-chloride-tube. With the potash-bulb it was, however, different. The potash-lye got yellow and after conducting the experiment several hours, a reddish filamentous precipitate appeared in the lye. A volatile body of an acid character was consequently evolved by the ferric urushiato, and whether carbonic acid at all was formed, remains doubtful.

The total amount of oxygen entering into the reaction is equal to the sum of increase in the different apparatus = 17.48 %.

If we suppose that the ferric urushiate, notwithstanding its partial oxidation before it was put into the flask, was still a compound of 14 atoms carbon, its empirical formula would be represented by  $C_{14}H_{18}O_{2.5}Fe_{7.5}$  with a molecular weight of 233.5 and the 17.5 % oxygen would be equal to 2.5 atoms, while the water formed would amount to 1.5 molecules.

The sample in the flask was taken out and at once analysed.

#### OXIDIZED FERRIC URUSHIATE.

	1	2	Mean.
Carbon =	67.80	67.57	67.79
Hydrogen =	7.70	7.49	7.59
Iron =	3.11	...	3.11
Oxygen =	...	...	21.51

C: H = 14: 18.8

C: O = 14: 3.33

Fe: C = 1: 101.7

To this substance again no definite formula can be given. It is surprising that the percentage of hydrogen has not diminished, although much of it has gone away in the form of water. Either in this or in the former analysis the amount of hydrogen has been found too high. The fact that 17.5 % oxygen entered into reaction with the ferric urushiate and that about 60 % of it was found again in the water formed, is not altered by this mistake.

The oxidation of the ferric urushiate had not finished in these ten hours. We divided 1.2520 gr. of the sample heated for 10 hours between two boats which we placed in a glass-tube enclosed in an air bath and kept at 100-104° for 36 hours while a current of dry air was constantly passed through it. After that time there was an

increase in weight of sample	= 0.0348 gr. = 2.78 %
“ “ “ “ calciumchloride-tube	= 0.2068 gr. = 16.52 “
“ “ “ “ potash-bulb	= 0.0752 gr. = 6.01 “

---

25.31 %



The oxidized product which had assumed a colour nearly as red as ferric oxide had the following composition :

Carbon	=	66.88
Hydrogen	=	6.69

In this case 58.0 % of the oxygen formed water, but we could again find no clear relation between the composition of the ferric urushiate before and after the oxydation and the quantities of water and volatile matter given off.

We therefore made another experiment with another iron-salt, prepared in the same manner as the ferric urushiate No. III. Its composition was :

FERRIC URUSHIATE No. IV.

	1	2	Mean.
Carbon	= 71.41	71.52	71.47
Hydrogen	= 7.68	7.66	7.67
Iron	= 2.30	...	2.30
Oxygen	= ...	...	18.56

C : H = 14 : 18.03

C : O = 14 : 2.73

Fe : C = 1 : 144.9

It was put in a long tube and heated in a current of dry oxygen in an air-bath at 100-103° for 36 hours. There was an evolution of heat, the thermometer in the substance being always 1-2° higher than that in the air-bath, but this difference was only perceptible when the air-bath was at 100° or higher. The volatile products of the oxidation were again collected in calcium-chloride-tube and potash-bulb. Sample taken, 2.6820 gr.

Increase in weight of substance	=	3.06 %
“ “ “ calciumchloride-tube	=	7.69 “
“ “ “ potash-bulb	=	5.75 “

---

Oxygen taken up = 16.50 %

41.4 % of the oxygen had formed water.

The composition of the oxidised ferric urushiate was :

	1	2	Mean.
Carbon =	66.58	66.85	66.72
Hydrogen =	6.78	6.73	6.75
Iron =	2.26	...	2.26
Oxygen =	...	...	24.27
C: H = 14:	17.0		
C: O = 14:	3.82		
Fe: C = 1:	137.7		

Taking into account the increase in weight (3.06 %) which the ferric urushiate suffers during the oxidation, the quantities of carbon, hydrogen and oxygen before and after the oxidation are the following:

	Before.	After the oxidation.	
Carbon =	71.47	68.76	2.71 Loss
Hydrogen =	7.67	6.96	0.71 Loss
Oxygen =	18.56	25.01	6.45 Increase

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3.03 Increase

The increase in the calcium-chloride-tube amounts to 7.69 %, corresponding to 0.85 % hydrogen, which nearly agrees with the loss of the substance. The oxygen is distributed thus:

Taken up by the substance	= 6.45 %
In the water formed	= 6.84 "
In the carbonic acid and volatile matter	= 3.21 "

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16.50 %

3.21 % oxygen require 1.20 % carbon to form carbon-dioxide. There remain consequently 1.51 % carbon unaccounted for, which is a new proof that the carbon partially goes away as a volatile matter which is not carbonic acid. The hydrogen lost by the substance is a little less than that found again in the calciumchloride-tubes, if the increase of the latter is taken as water only. It should be just the opposite, as the volatile matter of course also contains hydrogen. It is consequently proved that part of the volatile matter is condensed mechanically on the surface of the calciumchloride. A series of new experiments will be necessary to throw more light on this interesting reaction, especially to determine the quantities of the products formed, to decide the question

whether carbonic acid escapes with the volatile matter, to find the composition of the latter and to study the qualities of the oxidised urushic acid.

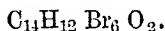
# DERIVATIVES OF URUSHIC ACID.

## *Hexabromurushic Acid.*

Urushic acid was dissolved in carbonbisulphide and an excess of bromine was added. Reaction set up at once, hydrobromic acid was evolved in large quantities, the solution darkened considerably and got warm at the beginning of the reaction but not so much so as to boil. After some hours we evaporated the solution on the water-bath until it had lost the smell of bromine. A very thick and dark brown paste remained which was dissolved in alcohol and filtered. Nothing, however, remained behind on the filter. After evaporation the substance was analysed and gave:

	Observed.	Calculated for $C_{11}H_{12}Br_6O_2$ .
Bromine .....	69.37	69.30

It is consequently a bromine-substitution-product of the acid with the formula



Chlorine also acts on urushic acid in alcoholic solution, forming yellow solid substances which we have not yet prepared sufficiently pure for analysis.

## *B-Urushic Acid.*

Urushic acid, when boiled with strong hydrochloric acid for several days with frequent stirring, to effect a more intimate contact of the two acids gradually gets solid and darkens a little in colour. It shows phenomena similar to those exhibited by the substance obtained from alkali-urushiate on decomposition with boiling hydrochloric acid, being first pasty like warmed caoutchouc and gradually getting harder and harder. To expel the enclosed hydrochloric acid thoroughly we cut the pieces several times with scissors and dried them on the water-bath for many days. The substance was then insoluble in alcohol and ether and did not dissolve in alkalis. Its composition was:

	Observed.	Calculated for $C_{14}H_{18}O_2$ .
Carbon	= 77.07	77.07
Hydrogen	= 8.77	8.26
Oxygen	= 14.16	14.68
C : H	= 14 : 19.12	
C : O	= 14 : 1.98	

Although the hydrogen is found a little too high there can be no doubt, that this substance has the composition of urushic acid. It is consequently a polymeric modification of the latter.

#### ACTION OF NITRIC ACID ON URUSHIC ACID.

On heating urushic acid with concentrated nitric acid, a very violent action ensues. The substance swells up enormously and becomes a yellow spongy matter. At this stage of the reaction, care must be taken that the reaction does not get too violent or the substance will get charred.

After the reaction had lasted about 3 hours, the yellow substance was washed with water, (in which it seemed partly soluble, as the water got coloured,) and then dissolved in alcohol. On addition of aqueous ferric chloride solution a yellow amorphous precipitate insoluble in alcohol was obtained, and analysed after washing and drying.

	Observed.
Carbon	= 51.49
Hydrogen	= 4.82
Nitrogen dioxide	= 26.77
Iron	= 9.77
Oxygen	= 7.15

Carbon and nitrogen dioxide are in the relation of 11 : 2.08 and the relation of hydrogen and carbon agrees with the former, being 15.7 : 14. The yellow substance is therefore a

#### DINITRO URUSHIC ACID.

But the matter requires further confirmation, the iron being apparently found too high.

When the nitric acid is allowed to continue its action on the yellow substance, the latter gradually dissolves in the acid, until finally a clear red solution is obtained. This requires about five days and during the whole of this time red gases escape. After evaporating the solution on the water-bath to drive away the nitric acid as much as possible, it gives on standing light yellow minute crystals. To make the syrupy mother-liquor give another crystallization, it was again treated with strong nitric acid on the water-bath for a day. This operation was repeated, until no more crystals were obtained. The different crops of crystals were mixed and several times recrystallized from ether, which reduced their colour to a pale straw yellow.

Combustion of the substance gave :

		Calcul. for		
		1	2	Mean $C_{13} H_{22} O_8$
Carbon	=	50.96	50.82	50.89 50.98
Hydrogen	=	7.13	7.20	7.14 7.19
Oxygen	=			41.97 41.83

There is no water of crystallisation in the substance. It melts without decomposition to a dark yellow mobile liquid at a temperature of  $135-6^\circ$ . It does not contain any nitrogen. In alcohol, ether and water it is easily soluble, especially in alcohol. It is an acid, but not of a very strong character. Its lead and ferric-salts are obtained as orange-coloured crystalline precipitates which are a little soluble in water. The silver- and barium-salts are white, crystalline and sparingly soluble in water. The alkali and calcium-salts are yellow and dissolve easily in water.

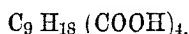
The analysis of the silver salt gave :

		Calcul. for		
		1	2	Mean $C_{13} H_{18} Ag_1 O_8$
Carbon	=	21.20	21.19	21.20 21.25
Hydrogen	=	2.39	2.59	2.49 2.45
Silver	=	58.86		58.86 58.85
Oxygen	=			17.65 17.44

The barium-salt had the composition :

	Observed.	Calcl. for $C_{13}H_{18}Ba_2O_3$
Carbon	= 27.02	27.08
Hydrogen	= 3.09	3.13
Barium	= 47.60	47.57
Oxygen	= 22.29	22.22

This new acid is consequently tetrabasic and represented by the formula



No name can at present be given to it.

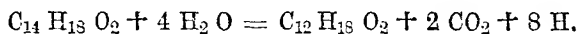
#### FUSION OF URUSHIC ACID WITH SODIC HYDRATE.

We introduced urushic acid in small portions at a time into fused sodic hydrate and stirred well. The mass boiled up very strongly. The temperature was raised until the danger of the substance catching fire was imminent and the heating continued for 2½-3 hours. The brownish black mass was dissolved in water, a black substance remained which was treated with alcohol in which it dissolved. To the solution which was now boiled, some hydrochloric acid was added which gave a slight precipitate of sodium chloride. Without removing the precipitate the solution was poured into water. A black amorphous precipitate separated out, which was collected on a filter and after thorough washing with hot water was dissolved in ether, of which a rather large quantity was required. The solution was filtered and evaporated. The substance obtained is after drying deep black, hard and lustrous, sparingly soluble in ether and alcohol and insoluble in water, alkali and dilute acids. By concentrated nitric acid it is attacked, but not so violently as urushic acid, although the same yellow sponge is formed.

The analysis gave:

	1	2	3	Mean	Calcl. for $C_{12}H_{18}O_2$
Carbon	= 74.50	74.32	74.36	74.39	74.23
Hydrogen	= 9.02	9.00	9.05	9.02	9.27
Oxygen	= ...	...	...	16.59	16.50
C: H	= 12: 17.46				
C: O	= 12: 2.00				

We repeated the analysis three times, because we doubted the result, but obtained always the same numbers. There is only one way to explain the formation of this body, namely:—

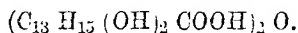


but it is difficult to believe that such a reaction should occur.

Another fusion was made at a little lower temperature, the time of heating and the way of purifying the product being the same. The black body obtained had the same qualities, but gave on analysis quite a different result.

	1	2	Mean	calcul. for $(\text{C}_{14}\text{H}_{18}\text{O}_4)_2 \text{O}.$
Carbon .....	65.04	65.00	65.02	65.12
Hydrogen .....	6.94	7.03	7.00	6.98
Oxygen .....	...	...	27.98	27.90
O : C =	9 : 27.88			
O : H =	1 : 4.002			

The numbers observed and calculated agree very well together. The composition of this substance can be represented by



We intend to continue the study of the action of sodic hydrate on urushic acid at higher temperatures to verify the results hitherto obtained and with the hope to obtain substances with still fewer carbon-atoms.

#### SUMMARY.

1. The raw lacquer juice is an emulsion which contains: (a) a peculiar acid, called urushic acid, (b) a gum, (c) a nitrogenous body, (d) water and (e) a volatile acid in traces. 2. The hardening of the lacquer-juice which takes place when the latter is exposed in a thin layer to moist air of (best) 20-27° C. is due to the oxidation of urushic acid into oxyurushic acid. 3. This oxidation is caused by the nitrogenous body, which is an albumenoid and acts as a ferment. 4. The oxidation is not accompanied by hydration. The water must be present only to keep the ferment in solution, which else would not act. 5. The oxidation takes place within narrow limits of temperature, ranging from about zero Centigrade to the temperature of coagulation of albumen. 6. The

gum seems to have a favourable influence in helping to keep the other substances in emulsion; but in the hardened lacquer its presence is injurious, causing it when in contact with water, to rise in blisters. 7. By mixture of the raw juice with urushic acid, the quantity of gum present is diminished, and the dried lacquer is enabled better to resist the injurious influence of water, besides obtaining a greater transparency. 8. The admixture of more than five parts urushic acid with one part juice weakens the action of the ferment and so deteriorates the quality of the lacquer. 9. The gum is very similar to gum arabic, but gives a sugar with two-thirds only of the reducing power of arabinose. 10. The ferment has the composition of albumen, except that it contains much less nitrogen. 11. Diastase and the ferment in the saliva cannot replace the lacquer ferment.

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#### DISCUSSION.

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Dr. Divers, in congratulating the authors of the paper upon their successful investigations, remarked that in all probability the direct effect of their work would be the improvement of the lacquer process, which was peculiarly a Japanese art.

In answer to an enquiry by Mr. J. M. Dixon, Mr. Korschelt stated his belief that lacquer poisoning was due to the urushic acid, which only gradually disappeared during the hardening process. In the best lacquers and in old lacquer there was of course no urushic acid.

Mr. Yoshida mentioned that he had found sugar of lead the best antidote to the poisoning—washing the skin in this substance removing at once all irritation.



## NOTES BY MOTOORI ON JAPANESE AND CHINESE ART.

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TRANSLATED BY BASIL HALL CHAMBERLAIN.

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[*Read 16th April, 1884.*]

[*Introductory Note by the Translator.*—Motoori, the greatest scholar and writer of modern Japan, was born at Matsuzaka in Ise in the year 1730, and died in 1801. This is not the place to tell the simple story of his life, or to enumerate his works. That has already been done by Mr. Satow in the Third Volume of these “Transactions;” and indeed so preëminent is Motoori’s position, that there are probably few members of our Society who have not some at least indirect acquaintance with his writings, mention being made of him in almost every serious book that has been published by foreigners about Japan during the last decade. The fact is that his influence has been almost as powerful on politics as on literature. To him, more than to any other one man, is due the movement which, some five-and-twenty years ago, restored the Mikado to his ancestral rights,—a debt of gratitude which was repaid a few years since by the elevation of Motoori (as of Mabuchi and of Hirata, the two other heads of the Shintō Revival School) to the national pantheon. As a stylist, Motoori stands quite alone amongst Japanese writers. His elegance is equalled only by his perspicuity; and his premises being once granted, his reasoning, when exercised on his special subjects of literature, politics, and religion, is generally faultless. The premises themselves are doubtless often startling to the modern English or American mind. Thus he constantly assumes the intrinsic excellence of despotism, and the moral superiority of the Japanese to all

other nations. Generally, too, the words "old" and "good" are synonymous in his mouth. But then, when have logicians ever made their premises their chief care? Be this as it may, the opinions of an eminent man on any matter must always command a hearing. This will be granted by all, even by such as may refuse their assent to Motoori's paradox, that connoisseurs are the persons least to be trusted on their own subject.

The notes here translated are to be found in Vol. XIV, pp. 16 to 23, of the "*Tama-Katsuna*," a miscellany in which are thrown together, without any attempt at order, jottings by Motoori on every topic under the sun. It was published in parts, the last part appearing ten years after the author's death. Like other Japanese works of this class, it requires a good deal of judicious skipping; but with such skipping, much pleasant reading and charming models of style may be extracted from it. The translation aims at faithfully representing the sense of the original, without pretending to a literalness which would disfigure Motoori's style still more than is inevitably the case in any version of his writings into a foreign language. For a correct rendering of some of the technical terms of art the translator's thanks are due to Captain Brinkley, R. A.

Motoori begins as follows:]

#### ON PAINTING.

The great object in painting any one is to make as true a likeness of him as possible,—a likeness of his face, (that is of course the first essential), and also of his figure, and even of his very clothes. Great attention should therefore be paid to the smallest details of a portrait. Now in the present day, painters of the human face set out with no other intention than that of showing their vigour of touch, and of producing an elegant picture. The result is a total want of likeness to the subject. Indeed likeness to the subject is not a thing to which they attach any importance. From this craving to display vigour and to produce elegant pictures there results a neglect of details. Pictures are dashed off so sketchily, that not only is there no likeness to the face of the person painted, but that wise and noble men are represented with an expression of countenance befitting none but rustics of the lowest degree. This is

worthy of the gravest censure. If the real features of a personage of antiquity are unknown, it should be the artist's endeavour to represent such a personage in a manner appropriate to his rank or virtues. The man of great rank should be represented as having a dignified air, so that he may appear to have been really great. The virtuous man, again, should be painted so as to look really virtuous. But far from conforming to this principle, the artists of modern times, occupied as they are with nothing but the desire of displaying their vigour of touch, represent the noble and virtuous alike as if they had been rustics or idiots.

The same ever-present desire for mere technical display makes our artists turn beautiful women's faces into ugly ones. It will perhaps be alleged that a too elegant representation of mere beauty of feature may result in a less valuable work of art; but when it does so, the fault must lie with the artist. His business is to paint the beautiful face, and at the same time *not* to produce a picture artistically inferior. In any case, fear for his own reputation as an artist is a wretched excuse for turning a beautiful face into an ugly one. On the contrary, a beautiful woman should be painted as beautiful as possible; for ugliness repels the beholder. At the same time it often happens in such pictures as those which are sold in the Yedo shops,<sup>1</sup> that the strained effort to make the faces beautiful ends in excessive ugliness and vulgarity, to say nothing of artistic degradation.

Our warlike paintings, that is representations of fierce warriors fighting, have nothing human about the countenances. The immense round eyes, the angry nose, the great mouth remind one of demons. Now will any one assert that this unnatural, demoniacal fashion is the proper way to give an idea of the very fiercest warrior's look? No! The warrior's fierceness should indeed be depicted, but he should at the same time be recognized as a simple human being. It is doubtless to such portraits of warriors that a Chinese author alludes when, speaking of Japanese paintings, he says that the figures in them are like those of the anthropophagous demons of Buddhist lore.<sup>2</sup> As his countrymen do not ever actually meet living Japanese, such of

<sup>1</sup> The cheap coloured prints called *Yedo-e* or *nishiki-e*.

<sup>2</sup> The 夜叉 and 羅刹. See pp. 172 and 102 of Eitel's "Handbook of Buddhism," s. v. *Yaksha* and *Rākchasa*.

them as read his book will receive the impression that all our countrymen resemble demons in appearance. For though the Japanese, through constant reading of Chinese books, are well acquainted with Chinese matters, the Chinese, who never read our literature, are completely ignorant on our score, and there can be little doubt that the few stray allusions to us that do occur are implicitly believed in. This belief of foreigners in our portraits as an actual representation of our people will have the effect of making them imagine, when they see our great men painted like rustics and our beautiful women like frights, that the Japanese men are really contemptible in appearance and all the Japanese women hideous. Neither is it foreigners alone who will be thus misled. Our own very countrymen will not be able to resist the impression that the portraits they see of the unknown heroes of antiquity do really represent those heroes' faces.

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It may be thought impertinent of me, as one totally ignorant of art, to express any opinions upon the subject. Yet all through the world individuals are unconscious of their own good or bad qualities, which can only properly be seen by lookers-on. It is the same in the case of the arts. Artists themselves are, of all men, those least able to judge, while the good points and the bad often reveal themselves to outsiders. It is because this is the case with painting that I venture to give expression to my views.

Now, as I have not minutely studied, or indeed seen a sufficient number of specimens of the art produced both in China and Japan during the successive ages of antiquity, I will leave that alone and treat only of such pictures as are to be commonly seen at the present day, viz., Indian ink sketches, tinted pictures, and highly coloured pictures.<sup>3</sup> As for the Indian ink sketches, their *raison d'être* being simply a display of touch by indicating an object as lightly and briefly as possible with a few strokes just daubed on, some of the very most skilful of them are doubtless worth looking at, and make one exclaim, "Yes, indeed! that is the way to draw!" But the productions of the great majority of these artists are worthless eyesores, and the particular favour accorded by the public

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<sup>3</sup> *Sumi-e, usu-zai-shiki and goku-zai-shiki.*

to all this rubbish is a mere blind following of a fashion once set. The enthusiasm for these same Indian ink sketches, and the rejection of all coloured paintings affected by our modern admirers of the so-called "Tea Ceremonies" is another case in point. It is not that these men have really formed an independent opinion, but that they perpetuate conventional rules formulated by the originators of their favourite pastime. Indeed, none of the things in which those persons who practise the "Tea Ceremonies" find such pleasure, possess a particle either of beauty or of interest—the written scrolls no more than the pictures; and the care and admiration lavished on them proves nothing but the obstinacy of their admirers.

\* \* \* \* \*

Tinted pictures are attractive, delicate, and pleasant to look at. When we proceed to consider the more highly coloured style, we also occasionally find something to admire. But not infrequently they offend the eye by their heaviness, as when the sea is represented of a deep indigo colour.

Of the many Japanese schools of painting, some have been handed down in certain families who make art their profession. Most of the pictures painted by members of these families are produced by a mere rigid observance of certain artistic conventions current in those families, without any regard being paid to the true shapes of the things themselves. Paintings of this class have their merits, and also their defects. Thus nothing can be more repulsive than the already mentioned travesty of great men as rustics and of beautiful women as frights. It is a defect, too, to mark the borders and folds of garments by a very deep line. All such things are mere tricks for the display of mastery over the brush. Again our artists, in painting pine-trees in a Chinese scene, make a point of delineating a special kind to which they give the name of "Chinese Pine,"<sup>5</sup> leading people to imagine that they are painting some particular variety of pine found in the old art products of that country. But there is no such species of pine in China. It is simply the ordinary

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<sup>4</sup>*Cha no Yu*. They are, properly speaking, tea-parties. But tradition having prescribed an elaborate ceremonial for their proper conduct, the actual partaking of the tea forms but a very small portion of the entertainment.

<sup>5</sup>*Kara-matsu*.

pine-tree drawn badly,—a defect which, will it be believed? has here been regarded as a beauty, and has been handed down by successive generations of artists!

Of all drawings the most repulsive are badly executed Indian ink sketches, representations of the above-mentioned "Chinese Pine," garments with the folds painted thick, and pictures of Daruma, Hotei, Fukurokujiu<sup>6</sup> and such like. They are without exception tedious enough to look at once, and I cannot imagine wishing to look at them twice.

\* \* \* \* \*

To observe ancient rules is doubtless an excellent thing; but then regard must be had to circumstances, and above all to the subject-matter. In painting, for instance, it is a practice by no means to be always followed; for it were bigotry to refuse to adopt an improvement introduced by others. On the other hand, there are some excellent things to be found among the conventions of the schools. What could be better, for instance, than the plan of showing the interior of a house by taking away the roof, or of dividing the nearer and the farther distance by means of clouds? Many are the defects to which a neglect of such conventions leads, and many are the excellences not easily to be attained to by the freer sketchers of the present day.

Again, there is a variety of styles now in vogue purporting to be imitations of the Chinese, whose votaries make a point of painting each object in exact conformity to nature. This is what is, I believe, called Realistic Art. Now I doubt not that the principle is an excellent one. At the same time there must be some differences between real objects and the pictures of such objects. Indeed there are cases in which a literal reproduction of the object as it is in nature produces a bad picture, unlike the object delineated. That is the origin of the conventions of the schools, and of the neglect by the latter in certain cases, of the facts of nature. Hence too the value of these conventions, and the perils attending their non-observance.

The Japanese artists of the traditional schools are good landscape-painters. Most Chinese landscape-paintings are repulsively ugly,—a

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<sup>6</sup>達摩. 布袋, and 福袋. Buddhist personages frequently represented in Japanese art,—the first often without any legs or else standing on a reed, the second with an enormous belly, and the third with an immensely elongated head.

result of the Chinese not observing our conventions, but painting as the spirit moves them. They know not how to arrange their subject, putting roads and bridges in impossible situations, placing rocks and trees in positions not suitable for such things, being sketchy where details are wanted, and abounding in detail where it were better to be sketchy. Even their very best paintings show these defects, resulting from the misplacing of trees and rocks, and from the aspect of precipitous peaks,—eye-sores which the Japanese schools avoid, thanks to the conventions by which they are guided in all these matters. Another grave defect to be noted in the Chinese artists is their predilection for painting ships and boats crooked. Doubtless it is in some such position that ships are generally to be seen; but that does not prevent it from being bad art to paint them so; for when so painted, they do not seem to be floating fairly on the water, their elevated stern giving them the appearance of being about to capsize. Such are some of the errors into which the Chinese artists fall by a neglect of rule and by excessive adherence to nature. Their birds and insects, again, though correct in detail, are mostly painted in a lifeless manner. They do not look as if they were flying or running. A further defect is their neglect of indicating the line of the ground when painting the leaves and stems of trees and plants. There being in nature no such line to mark the ground, they are, I suppose, imitating nature in omitting it. But in a painting, the absence of such a line causes confusion. What we mean by the ground, relatively to actual objects, is the place where the objects are not,—a place without any colour in particular. But the ground of a painting being white, that part of it which is destitute of objects will be white. Hence a difference for the painter between it and the colourless ground in nature; hence also the absolute necessity of a line. The neglect of Chinese artists to mark such a line arises from ignorance of this consideration. Even in Chinese pictures, however, the line is unavoidably inserted in the case of the human face. From the apparent absence of conventions, and from the consequent license given to the individual artist in China comes the unsatisfactory representation of the manner in which branches spread, of the stems of herbs and flowers, and of the position of leaves. The existence of such conventions regulating every thing would seem to have preserved the Japanese schools from like defects.

The above-mentioned objections would seem to apply to Chinese art in general. On the other hand, a comparison of the works of the Chinese artists with those of the Japanese schools, so far as the delineation of birds, beasts, insects, fishes, and plants is concerned, shows that the extremely careful attention of the former to detail leads, in the hands of the most skilful, to representations that are the exact counterparts of the original. Few of the productions of our schools can be mentioned alongside of them: the hair of the beasts, the down of the feathers, the pistils of the flowers, the veining of the leaves,—all is rough. It is doubtless the idea that it were useless and even faulty to draw in too detailed a manner pictures which are only to be viewed from afar, such as those on the screens in large houses or on walls, that has led to the esteem in which the sketchy style is held in our country. But surely the more finished paintings of the Chinese are the more pleasing to the eye. Thus, a comparison of the production of our schools with those of the Chinese painters shows that the art of each country has its good qualities and its bad, and that it were hard to give the palm to either.

Again, of recent years we have witnessed the rise of a large class of artists who neither hold to the traditions of the schools, nor derive their inspiration from China, but who are freely eclectic as their own taste may dictate. Thus, culling the good and rejecting the bad, they seem to be preserved from any very glaring defects.<sup>1</sup>

[*Concluding Note by the Translator.*—So far Motoori. It will be seen that his observations make no pretension to completeness. If he speaks authoritatively, it is only with the authority of one who is *not* a connoisseur. His sole guide in judging of the art of his country is common sense, supplemented by talent and by a vast fund of general knowledge. The result of his plain, unbiassed investigations is certainly somewhat faint praise;—this too from a man who was patriotic almost to fanaticism. As such, his remarks have seemed to me worth making known to foreigners, not a few of whom may often feel inclined to think Chinese and Japanese paintings ugly and grotesque, without daring to say so for fear of being looked down upon as wanting in proper esthetic

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<sup>1</sup>Motoori would seem to have in his mind such men as Hokusai and Yōsai, who struck out a line of their own during the eighteenth century.



feeling. They may take courage: they have the greatest mind of modern Japan on their side, or very nearly on their side. They may laugh, too, at the much belauded "Tea Ceremonies," and yet remain in the very best native company. For myself, I would not venture to express any opinion on such difficult and technical subjects. I am but half convinced by Motoori's paradox that connoisseurs are less good judges than other folks. Anyhow it is always pleasant be able to help in obtaining a hearing for both sides of any question.]

ON THE "CORVUS JAPONENSIS, BONAPARTE " AND ITS  
CONNECTION WITH THE "CORVUS CORAX, L."

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BY PROF. DR. D. BRAUNS, LATE OF TÔKIÔ.

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TRANSLATED BY J. M. DIXON, M. A.

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[Read 16th April, 1884.]

Among the singing-birds of Japan the crows occupy a position of considerable importance. This cosmopolitan family is very well able to elucidate the relationship of Japanese fauna to other fauna, especially as the number of species is by no means inconsiderable.

The following varieties are met with:—The *Corvus* proper, *Monedula*, *Pica*, including the *Cyanopica* or the *Cyanopoliis*, *Garrulus*, *Nucifraga*. The last-mentioned alone is represented by only one species, while the *Corvus* has three (some say four), *Monedula* two, *Pica* (if we do not separate the blue magpie) two, and *Garrulus* excluding two species *Garrulus sinensis*, Gould, and *Garrulus lidthi*, Bonap., whose existence in Japan is very doubtful, also two species. In Blakiston and Pryer's Catalogue of the Birds of Japan, published in Vol. X. Pt. I. of the Transactions of the Asiatic Society of Japan, every possible concession is made to the adherents of geographical species, and to the devoted classifiers of species; and yet even there four species are acknowledged to be identical with European species, viz., the *Nucifraga* species, two ravens, *Corvus corax*, L., and *corone*, L., and the common magpie.

We will not here discuss why the blue magpie of Eastern Asia should be regarded as distinct from the European species found in the

Spanish peninsula, nor why the *Garrulus japonicus*, Bonap., should be regarded as distinct from the *Garrulus glandarius*, L. In reference to the latter it may be merely pointed out that doubtless intermediate varieties exist between our western and the Japanese species, which connect these extremes even locally, and link together the differences in the colour of the plumage, which are always quite insignificant. Indeed, after all, the opinion of Temminck and Schlegel, that the *Garrulus japonicus* is nothing more than a variety of the *acorn-jay*, may be found to be the only justifiable one. Possibly the fact of having discovered and established a new species, which may figure as 'quite a local species,' may have a certain interest for local collectors and investigators, yet we should never forget that science is not served by a mere exotic name. Indeed in so many cases has the existence of a distinct species remained a thing still to be proved,—sometimes even if a *sub-genus* was constituted—that undoubtedly the greatest caution is necessary in reference to such new names. Of birds might be quoted *Hirundo gutturalis*, Scop., *Yynx japonica*, Bonap., *Coturnix japonica*, Temm. and Schl. (given by them with some reservation); likewise the blue magpie of south-western Europe, which was distinguished by Bonaparte from the Pallas species under the name *Cyanopica cooki*, chiefly, as it seems, from zoö-geographical reasons. Certainly the white tip to the tail, which moreover is not constant in the eastern variety, is no sufficient reason for a true division. Accordingly if we take these two species merely as varieties of colour, there would remain only four (or five) distinct, that is to say, not European, or better, not general-palæartic.

Of these there are two, the second species of jay (*G. brandtii*, Ev.), and one of the jackdaws (*M. daurica*, Pall.) decidedly northern—northern-Chinese Siberian—the first species being only northern-Japanese, and the second species rarely found. There remain therefore only two (or three) unaccounted for—of which one, the *Monedula neglecta*, Schlegel, is not, to my knowledge, found out of Japan. It was first considered as the young of the *Monedula daurica*, and in the Fauna Japonica of Siebold is represented and described as such. It is easily recognized, and is often met with in Japanese paintings. Next to the third species, which I cannot consider as distinct and therefore merely cite as doubtful beside the two others, it is the best known in Japan, although the blue

magpie is equally common. The second, *Corvus pastinator*, Gould, is similarly a Japanese representative of our rook, as the foregoing species of jackdaw is of the *daurica*.

In the eighth volume of the Transactions of the Asiatic Society of Japan, page 212, (No. 189), Blakiston and Pryer described the *Corvus japonensis* not quite correctly as intermediate in size between the Carrion Crow and the Raven, that is, between *Corvus corax* and *C. corone*. In the new catalogue, under the same number, the same statement is repeated, and moreover the species is sharply distinguished from the *Corvus corax*.

Regarding the relative importance of the species referred to, it would have been worth the while even of the able authors of the Catalogue of the Birds of Japan to bring forward reasons for the separation of the two species, namely, the *Corvus japonicus*, Bonap., and the common raven.

From the beginning of my stay in Japan my attention was directed to the Japanese Raven. In my early days I had full opportunities of becoming acquainted with the largest European species of Raven, and this naturally led me to observe and compare with it the Japanese species which most nearly represented it. The *karasu*<sup>1</sup> struck me at once as bearing an extraordinary resemblance to our Raven not only in size, shape and plumage, but also in its voice, its motions, and other peculiarities of behaviour; and also chiefly—if I may be allowed the expression—in its moral and intellectual qualities. The *karasu* differs only in this, that it lives in company and does not hesitate to make its abode in cities and elsewhere; and consequently it is oftener seen along with others of its kind when they go thieving together and over-reaching other animals.

In regard to its bodily appearance, the Japanese species can certainly be distinguished at first sight from the European raven by its smaller size. But this is no good criterion of species, and I have always

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<sup>1</sup> Note.—With Blakiston "hashibutogarasu," that is, 'heavy-beaked crow', as distinguished from "hashibozogarasu", 'small-beaked crow' or *Corvus corone*. The testimony of these names is surely somewhat remarkable, seeing that Blakiston and Pryer have so much to say against its being the true raven.

stated it as my opinion that only an accurate comparison of the skull and the beak could satisfactorily settle the question, whether the *Corvus corax* and *C. japonensis* must be considered as distinct or as identical. From the beginning I contended warmly against two of the statements made by Blakiston and Pryer. In the first place, on the basis of the material laid before me, I could express my conviction\* that the *Corvus corax*, L. is not to be distinguished from *Corvus japonensis*, B. Two specimens of the former bird, contained in the Yesso collections, and brought from Yotorup, the largest and most southerly of the Kurile Islands, are only extraordinarily large and old specimens of the *Corvus japonensis* cited under 189. Secondly, I expressed with the same energy my disapproval of the opinion already quoted that the *Corvus japonensis* is an intermediate between the raven and the crow, and insisted strongly that it is closely allied to the former, and is no more nearly allied to the latter than the *Corvus corax* itself.

Now it is a matter of satisfaction to me, that after comparing the *Corvus japonensis* with European specimens of the *Corvus corax*, I have been able to establish the identity of all portions of the skeleton. Moreover, and this may have even a more general interest, I have succeeded in showing that the differences of absolute size agree in no small measure with such characteristics as result from less-advanced age. The so-called *Corvus Japonensis*, in reality, resembles in many features the younger specimens of the European *Corvus corax*, which lie before me for comparison. This fact likewise threw much light on the problem, how it came about that the Japanese *karasu* when old and large, as in the Kurile specimens, has been referred to as *Corvus corax*.

In mentioning the separate points of similarity, I turn first to the skeleton and its measurements. These I got by comparing a strong full-grown male specimen in the anatomical collection at Halle, with the skeleton of a *karasu*, also male, brought by me from Tôkiô, and now forming part of the same collection. The skeleton belonged to a considerably younger bird, a drawback not easily avoided; for the *karasu* of Tôkiô, Yokohama, Hakodate and elsewhere, living together in numbers, do not as a rule reach so advanced an age as the solitary ravens of the forest. If we place the measurements of both birds side by side in a tabular form we have:—

	For the German <i>Corvus</i> <i>Corax</i> Mm.	For the <i>Karasu</i> of Tôkiô Mm.
Length from the point of the beak to the back hole in the head (the centre) .....	108.0	98.0
The whole skull measured horizontally .....	115.0	105.0
The whole skull measured obliquely .....	118.0	108.0
Length of the upper bill in horizontal projection ...	66.0	60.0
Length of the upper bill obliquely from the point to the base .....	69.0	63.0
Length of the nostril.....	19.0	18.0
Height of the bill at the base.....	17.0	15.0
Vertical distance between the point and the base (in projection).....	26.0	23.0
Height of the bill at the outer side of the nostril...	16.0	15.5
Height of the bill just between that and the point...	11.5	11.0
Hole between the two eye-cavities.....	3 × 0.3	8 × 6.
Eye-cavities.....	27 × 2.0	26 × 19
Distance of the inner side of these from the point of the bill.....	93.0	87.0
Height of the skull .....	28.5	27.0
Breadth of the skull (maximum, in the region of the orbits) .....	46.0	42.0
Breadth of the skull behind.....	43.0	38.5
Breadth of the upper beak at the nostrils.....	24.0	22.5
Breadth just before the nostrils .....	18.0	16.5
Breadth half way between that and the point of the bill.....	12.5	12.0
Greatest distance of the lower jaw.....	45.0	41.5
Breadth of the lower bill under the nostrils.....	24.0	22.5
Total length of the lower jaw bones.....	93.0	86.0
Length of the bill portion of the same.....	54.0	5.0
Height of the lower bill .....	10.0	9.0
Vertical distance of the point of the bill from the inner upper edge (in projection).....	13.0	11.0
Convexity of the bones.....	7.0	6.5

	For the German <i>Corvus</i> <i>Corax</i> Mm.	For the <i>Karasu</i> of Tôkiô Mm.
Size of the cavity.....	8 × 3.5	10 × 5.5
Size of the square bone.....	19 × 14	18 × 13
Length of the neck portion of the vertical column...	125.0	113.0
"    breast-portion    "    "    ...	58.0	53.0
"    sacrum .....	58.0	52.0
"    tail, measured obliquely .....	45.0	40.0
"    tail, to its tip .....	32.0	28.0
"    plough bone to the tip .....	28.0	23.5
"    of the upper portion of the plough bone, measured obliquely .....	23.0	19.0
Greatest thickness of the cervical vertebra.....	13.0	11.5
Breadth of the sacrum at its greatest.....	43.0	37.0
The sacrum curves backwards.....	5.0	3.5
Front <i>spina</i> of the pelvis measured from the back part of the sacrum in projection.....	40.0	35.0
The joint-pans (cotyla) of the femur stretch behind the sacrum in projection.....	37.5	34.0
* The same lie across from each other .....	38.0	35.0
Length of the furculum .....	57.0	52.5
"    of the raven bone.....	56.5	51.5
"    of the scapula .....	66.0	60.0
"    of the humerus .....	90.0	80.0
Maximum breadth of the same.....	25.5	19.0
Distance of the joint-pans from each other .....	48.0	40.0
Bones of the fore-arm.....	112 × 103	92.5 × 85
The whole claw .....	103.0	91.0
Height of the sternum, (including the side portions in projection) .....	42.0	32.5
Height of the same without the side portion.....	31.0	23.0
Height of the crista.....	25.0	18.4
Lower breadth of the sternum.....	47.0	44.0
Length of the sternum .....	75.0	63.5
Size of the segment at the lower end.....	10 × 8	12 × 8

	For the German <i>Corvus</i> <i>Corax</i> Mm.	For the <i>Karasu</i> of Tokiō Mm.
The side parts measure .....	22.5 × 12	20 × 10
The last ribs curve forward.....	60.0	50.0
Hinder branch of the same, descending from behind obliquely .....	70.0	60.0
Fore-branch ascending from behind obliquely .....	45.0	40.0
Femur length .....	66.0	60.0
Tibia .....	11.0	97.0
Leg bone.....	65.0	60.0
Longest toe .....	52.0	50.0
Side toes .....	42.0	39.0
Hind toe .....	43.0	41.0

If we compare the columns with one another we find, to begin with, that in no case do the figures show an important discrepancy, if we multiply the second column by the factor 1.1, or divide the first by the same number. This will equalize the difference in absolute size, which accordingly does not amount to more than 10 per cent. The only real discrepancies which remain are:

1. The gaps and holes, which fill up with the growth of the animal and of its bones, are larger in the Japanese specimen.

2. In like manner the plough-bone is less, even in excess of the above ratio.

3. The sternum is less developed.

4. The upper-and fore-arm bones similarly; the former shows also a slight interval between the joint heads of the two sides from each other.

5. The toes likewise differ slightly from each other; and those of the Japanese raven, although absolute smaller, would become too large if increased according to the given ratio.

All these are undeniable signs of a youthful condition, and would be repeated necessarily in younger and less developed specimens of our *Corvus corax*. The differences, therefore, when contrasted with the numbers as a whole, are seen to be insignificant: the humeri are as 8:9: their distance 10:12; the fore-arm bones in the same proportion;



the claw 100:113½; the toes 100: 104 to 105. It is then quite inadmissible to speak of any difference whatever in the dimensions of the skeleton that could possibly be looked upon as a specific difference.

This appears most of all in the skull and beak, to which Blakiston and Pryer would even appeal. The strength and length of the beak of the Japanese raven is also proportional to that of the European raven. At the end of the paper I give geometric sketches (1) of the skull of the so-called *Corvus japonensis* in profile, of the upper beaks in profile; (2) of the German and (3) of the Kurile *Corvus corax*; (4) of the cross-section of the beak in fig. 2, and (5) cross-section of the beak in fig. 1. These cross-sections are perfectly similar to each other, the only difference being the slightly greater size of the European specimen. A comparison of the geometrical figures shows that despite the smaller absolute size of the bird, and the shortness of the beak, both of which Blakiston exaggerates, his statement is quite unfounded that the bill of the latter, *Corvus japonensis* is much thicker, and the ridge more arched.<sup>2</sup>

It fares no better with the other distinguishing marks which are given for the discrimination of two species said to be distinct. Undoubtedly many readers will be somewhat surprised to be told that one marked characteristic is that "the reflections of the plumage are different." This seems virtually to admit that there exists an absence of real difference in the colour of the plumage. In reference to the arrow-shaped feathers on the belly and upper breast, they are by no means absent in the Japanese raven, although perhaps less distinctly marked and less beautiful. Now the very same thing is the case with the younger specimens of the European raven. This especially struck me in one of the specimens of the *Corvus corax* in the Zoological Collection of the University of Halle, and I found the difference between it and the older specimen much more distinctly marked than the difference between the latter and the more developed Japanese specimens. I mention here that the beak of the younger German *Corvus corax* measures, with the horn-envelope, which of course causes the very marked hooked projection at the point, only 69.5 mm. We may therefore suppose the length of the

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<sup>2</sup>Compare further on when the measurements of the outer covering are referred to.

bone part to be from 64 to 65 mm.; a fact which helps us considerably in our attempt to close up the gap between the Japanese and the European raven.

Lastly we are quite unable to understand Blakiston's statement that "*Corvus corax* has a wedge-shaped tail; *C. japonensis* half round." It is surely a well known fact that *Corvus corax* and *Corvus fragilegus* unite in differing from the other members of the crow family, *Corvus cornix* and *C. corone* in having a strongly curved tail, the latter having a straight tail. Now the wedge-shaped tail, which Blakiston wrongly assigns to *Corvus corax*, is allied to the straight. The *Corvus japonensis* of Blakiston and Pryer's catalogue is, on the contrary, with its curved ("half round") tail, a real raven. Now certainly it would be a matter for surprise if the Kurile raven, which the catalogue calls *Corvus corax*, had a wedge-shaped tail. Yet this is explained very simply, when we consider that the two specimens, undoubtedly birds of great age and of unusual size, are somewhat deficient in their plumage, and are also badly preserved. These birds I myself saw.

And now for the last remark under No. 189 in the Catalogue, for which a very short refutation will suffice. Blakiston lays some stress on the recently proposed generic separation of ravens and crows (Rabenkrähen), and therefore the creation of the genera *Corvus* and *Corone*. In doing this he emphasizes the fact that modern ornithologists have placed the *Corvus japonensis* in the latter genus. Now the fact is that the Japanese *karasu* is not known, or certainly not sufficiently known, to these ornithologists. As already stated, Blakiston attaches great weight to its powerful and strongly curved bill. Temminck and Schlegel called it *Corvus macrorhynchus*, and thus assimilated it to a more southerly kind with an equally striking heavy bill. Sharpe likewise,—whom, strange to say, Blakiston and Pryer also quote—comes to the same conclusion.

The measurements given by Blakiston are grouped as follows. The very old Kurile specimens already mentioned have indeed a total length of about 660 mm. by 440 mm. for length of wing; but German specimens go as low as 610 and 590 mm. This does not take into account the skeleton, which, after the addition of the length of the tail feathers, viz., 230 mm., gives a total length of about 630 mm. Moreover, it is to be remarked that the specimen having a total length of 610 mm.

is a finely developed bird, whose breast feathers have a distinct arrow form. It has likewise 440 mm. length of wings, and 80 mm. length of beak, against 75 of the Kurile specimens, and of the above measured in the skeleton, if we add to the latter what is wanting, viz., the horn-beak, still observable. The length of the wings goes as low in the other German specimen as 415 mm., although it happens that with it the wings project nearly 20 mm. beyond the end of the tail, whilst in the former they do not quite reach it.

The Japanese specimens, after many measurements made by myself, show an average total length of certainly not less than 560 mm., therefore only 30 mm. less than the youngest of the German specimens examined by me. The size of the latter is plainly reached and even exceeded by several of the specimens from Tôkiô, Hakodate, and elsewhere; the maximum noted by me amounting to 595 mm. The wings always show in these the characteristic marks of the *Corvus corax*, inasmuch as they always reach the end of the tail. Seeing that the length of the tail feathers amounts to 200-260, it follows that the length of the wings amounts to about 360, which agrees on the whole with the measurements given by Blakiston. His measurements, however, always lean to the small side, and cannot be held to furnish in any way a true average.

We have still to consider the eggs, which Blakiston and Pryer drag into their argument. If they here lay stress upon the fact that the "greenish" eggs "with darker spots" cannot be distinguished from those of the black crow, they merely give in truth a new feature common to the European as well as to the Japanese raven. For the eggs of our *Corvus corax* have exactly the same colour as those of the *Corvus corone*. In both is found the well-known, greenish ground-hue, with a speckling of brown, generally in patches and pretty close, but here and there at certain points still darker and closer. The likeness between the exterior of the eggs of the two species is indeed surprising, so that they can hardly be distinguished save by their size. At most it might be thought that, in proportion to the length, the cross diameter in *Corvus corax* is somewhat greater on the average. But in both respects, as well the absolute size as the shape, both species merge into one another so that only the extreme forms, but not the average, admit of a certain

determination. This is an undoubted result of the scanty material I had to work with. Three eggs of *Corvus corax* measured 46 by 36, 48 by 33, 44 by 32 mm., therefore the average dimensions are 46 by 43.5. The cubic content of the eggs amounted to 46.5 cubic cm., 41, and 35.5, on the average to 41 cm., which is also nearly the cubic content that corresponds to the above average dimensions. 8 eggs of *C. corone* had 46 by 31, 45 by 31, 45 by 29, 45 by 29, 43 by 30, 42 by 31; the average dimensions are therefore  $43\frac{3}{8}$  by  $29\frac{1}{2}$ , which corresponds to a cubic content of 30 cm. This is at the same time the average of the separately calculated cubic contents of the light eggs, which vary from 36 to 23. We see then that even the above average figures of dimensions do not greatly differ from each other, namely 7 p. c. in length and 12 p. c. in thickness. Further, the smallest raven eggs are distinctly smaller than the largest crow eggs, and the length of the former often falls considerably below the maximum of the latter, whilst the figures for thickness are certainly extraordinarily close. As the birds build their nests in the same fashion, all that is urged by Blakiston respecting the egg-laying of the *Corvus j.* as compared with *C. corone*, may be equally said of the *C. corax*.

If we therefore sum up our results, we must begin by conceding that the majority of Japanese specimens of raven are smaller than the average of our raven. But as against this if we consider how thickly the Japanese birds crowd together, especially in places on the coast, where the people feed more on fish, it is quite evident that there will be found among them a much larger proportion of younger birds. It is true I have no great datum in hand as to the length of a raven's life, but that as a rule they reach a considerable age is scarcely to be questioned. This more advanced age, together with a more powerful development or even an aged condition corresponding to their more advanced age, will be mostly reached, we may judge, by the solitary specimens, who are permanent residents of the woods. In Yesso, where unfortunately I obtained no spoils of the chase, I could at least notice in the outlying woods the most beautiful and powerful specimens of *karasu*. On the other hand, wherever they fly about in crowds and make themselves useful as scavengers, aiding the street police, as at Hakodate and Otaru, they present the same appearance as in Tókió. Here as

there their boldness is sometimes nearly incredible. As they are not pursued, properly speaking, they appear in great numbers in favourable places. The result is a diminution in the size of the individual birds of these communities.

No doubt the *karasu* is somewhat modified outwardly in its habits by changed conditions of life, to which, as it is possessed of very great intelligence, it could adapt itself and has adapted itself. If, notwithstanding all that has been said, we still hesitate to admit its real identity with the *Corvus corax*, surely the existence of larger and older specimens in Yetorup might take away the last shred of doubt. That these are indeed aged forms is shown very evidently by the bill of one, the edge of which is beginning to curl inward. They have exactly the same plumage as their Japanese fellows; they are undoubtedly larger in size, but this does not necessitate their being reckoned in a different species (15 to 16 p.c. greater than the smaller specimens, and scarcely half as much greater than the larger). The structure of the body and especially of the cranium and beak put it beyond a doubt that they are only well developed specimens of the same species. The less developed representatives (we cannot call them dwarfed) have formed a separate species as *C. japonensis*.

We conclude therefore that *C. japonensis* must certainly be called *C. corax*, or at most *var. japonensis*. It can no longer be viewed as a species isolated from the rest of the world. It is the local representative of a truly palaearctic and at the same time very important species. Placed in unusually favourable conditions of life, and not interfered with by man, it has been enabled to multiply extraordinarily, and to drive out other birds, which elsewhere maintain a successful rivalry with it. We have here an instructive example of the intellectual adaptability of an animal species, and have been hindered from its consideration until now by the artificial separation of the Japanese raven from its original stem—surely a mechanical rather than a zoologically scientific separation. In spite of every protest the Japanese raven has been sharply distinguished from all others.

I hope that these lines may help to strengthen that protest and bring about a correcter comprehension of the real state of things.

*Note.*—Just in passing I would remark that the distinction made between the supposed two kinds by the Japanese in Yetorup, which Blakiston mentions, is in my opinion of no value. It distinguishes their different places of abode, *hamagarasu* meaning 'raven of the coast' and *watarigarasu* probably 'raven flying over the island.' Even though the latter signified 'raven that has flown to the island,' the etymology would have no particular signification.

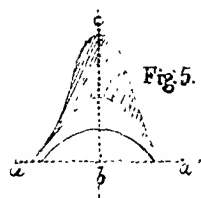
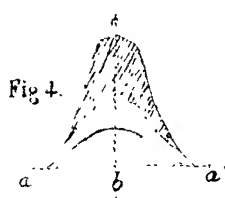
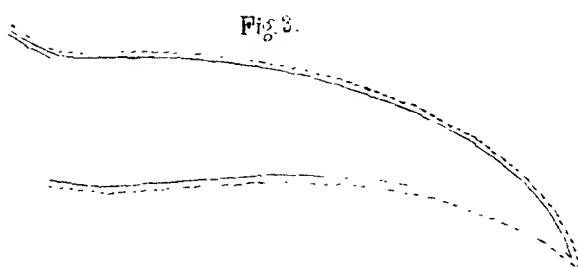
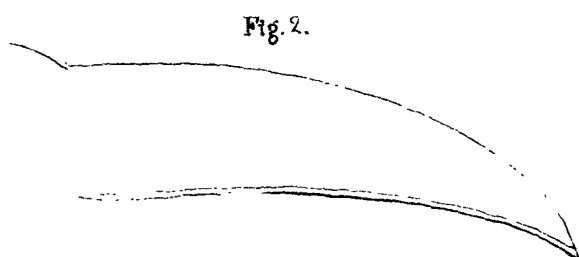
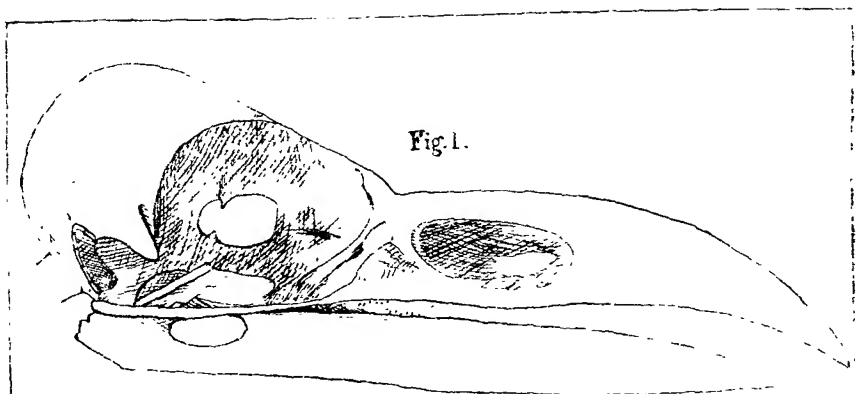
Also I should like to refer very cursorily to Holböll's *C. corax* var. *littoralis* Grönland, whose points of difference from our own [raven have likewise been reduced to mere differences in the manner of life. Yet Holböll at first wished to assert a difference of proportion between beak and *tarsus*. (See Kroyer's nat. Tidsskr. 1843, IV, p. 390 and Holböll's *Beträge z. Fauna Grönl.* ubers v. Paulsen.)

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#### DISCUSSION.

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Professor Milne, after apologising for his want of special ornithological knowledge, remarked that he had listened to Dr. Brauns' paper with great interest, and no one could accuse its author of not having examined the question which he had put before the meeting most minutely. The minuteness, however, only extended in one direction. Dr. Brauns had told us very much about the hard parts of the Japan Crow, but we had heard nothing about its soft parts. The result of the numerous measurements which Dr. Brauns had made of the scanty materials with which he worked, showed a slight difference in the size of the European Raven and the Japanese Crow, but there was no noteworthy difference in the proportions of these parts. To such conclusions Mr. Milne objected, remarking that in this group of birds on account of the great similarity in the structure of their skeletons slight differences ought to be emphasized. Among these differences there was the difference in the shape of the beak and in the ratio of the length to the breadth of the skull. In speaking of the soft parts of the bird, Mr. Milne asked the question whether a Japanese Crow had ever been taught to imitate the human voice, an accomplishment so common with the Raven. The reason that the Raven was able to talk was in consequence of its possessing certain muscles in its throat enabling it to alter the dimension of its wind-pipe. Had the Japanese Crow a similar development? Turning to the external characters of the bird, Mr. Blakiston told us that the Raven of Europe and that of Itorup (which Dr. Brauns called the *first* of the Kuriles) differed from the Japanese Crow in possessing certain peculiar feathers in the breast and having a wedge-shaped tail. Dr. Brauns apparently denied the first peculiarity, and explained the latter by saying that the Kurile Islands specimens were old birds, whilst the crows which had been collected were probably young birds. Mr. Milne considered it very







improbable that Mr. Blakiston and those whose business calls them to the Kuriles should always collect old birds in the North, and only young ones in the South. If the wedge-shaped tail existed in the Northern bird, as he believed it did, whilst the tail of the Southern bird was curved, Mr. Milne considered that such a difference ought to be sufficient to constitute at least a difference in species, especially when we remember that in fish it constitutes not simply a difference in species but a difference in orders. Then there were differences in distribution and in habit to be considered. The larger bird called a Raven existed in the North, whilst the bird called a Crow was found in the South. The former was a solitary bird building on cliffs, whilst the latter was gregarious, building as often in trees as elsewhere. Even the cry of the two birds were different. Finally, after pointing out other differences between the birds under discussion, the probabilities of Mr. Blakiston's determination being right were to be considered. Mr. Blakiston had made the ornithology of Japan a specialty for over 20 years, and his birds had been compared by European authorities. On the other hand, Dr. Brauns, although a distinguished geologist, had not made birds a specialty and had only been to Japan for a short time, and although during that period he had accomplished very much that was valuable, he had in this instance as in others attained results which could not escape criticism. The Japanese considered the Northern and Southern birds to be distinct,—foreigners who see the Northern raven every year, who have shot the bird, taken its nest, and brought home the young ones, consider that the question of the distinction is beyond argument,—Messrs. Blakiston and Pryer, together with distinguished naturalists in Europe hold similar opinions,—whilst Dr. Brauns, who works with scanty materials, comes to opposite conclusions. Had Dr. Brauns or Mr. Blakiston been present it would not have been necessary to discuss the probabilities of the question, but in the absence of a special ornithologist there was no alternative. He would leave the members of the Society to judge as to who was probably correct.



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## Notes on the History of Medical Progress 245 in Japan.

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BY WILLIS NORTON WHITNEY, M.D., TOKYO.

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[*Read May 21st. 1884.*]

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In presenting this sketch of the history of Medical Progress in Japan, the writer is well aware of its incompleteness, yet ventures to hope that at least in its references to various sources of information, it may prove useful to those who care to give the subject further consideration; and that the causes underlying the rapid and almost phenomenal progress, which the science of medicine has recently made in this land, may become more evident; and that the names of a few of those who have been most instrumental in bringing about such great reforms may be better known to the western world.

The materials for this paper have been gathered from various sources, principally Japanese writers of recent date, whose information has been obtained from numerous records and writings of ancient and modern times.

To Mr. Kochi Zensetsu, whose brief sketch of Japanese Medicine forms the basis of this paper,<sup>1</sup> the writer is especially indebted, as well as to Muramatsu Kisei,<sup>2</sup> Gonta

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1. 大日本醫道沿革考 (MS.) Sketch of the History of Japanese Medicine.

2. 日本醫術沿革考 Sketch of the Changes in Japanese Medical Art.

Naosuke,<sup>3</sup> Asada Koretsune,<sup>4</sup> Sato Hotei, Otsuki Shinji, Sakakibara Yoshiwo,<sup>5</sup> Sugita Gempaku,<sup>7</sup> and Kaku Kashiro.<sup>8</sup>

246 Among the most ancient records which make mention of medical affairs are the *Ko-ji-ki*, or Records of Ancient Matters, and the *Shundai-ki*, or Records of the Divine Age, also the *Nihon-gi*, or Chronicles of Japan, while of more recent times the sources of information are quite numerous. To many of which sources, as well as to those already mentioned, the writer desires to acknowledge his indebtedness. Further acknowledgment is made by various references throughout the paper, and also in the appended list of authors referred to.

For convenience, the subject of this paper is divided into five parts, corresponding to five<sup>9</sup> most important periods of the Medical History of Japan, namely:—

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3. 古醫道沿革考 Notes on Ancient Japanese Medicine.
  4. 皇國名醫傳 Biographical Dictionary of Famous Japanese Physicians.
  5. 奇魂 Strange Spirits, or Ancient Rules of Medicine.
  6. 日本教育略史 Outline History of Education in Japan, Philadelphia, 1876.
  7. 蘭學事始 Beginning of the Study of Dutch in Japan.
  8. 皇國醫事沿革小史 Short History of Japanese Medical Progress.

In the English rendering of the names of works referred to above and elsewhere, an attempt has been made to give an idea of the contents of these works rather than an exact translation of the titles.

The *Shin-dai-ki* or *Shin-dai-maki* is, strictly speaking, a portion of the *Nihon-gi*; but as frequent reference is made to it as a separate work by authors quoted herein, its distinctive title is retained.

9 In the valuable and most interesting contribution to the subject, by Mr. Kaku Kashiro of the Prefecture of Wakayama, the following division of the subject, is made: I—Period of pure Japanese medicine, terminating about B.C. 91; II—Period during which both Japanese and Korean were employed, B. C. 91 to A. D. 554; III—Period during which Chinese medicine flourished, from A. D. 553 to 1156; IV—Period of decay A. D. 1156 to 1600; V—Revival of medical learning A. D. 1600 to 1760, VI—Introduction of European medical sciences from 1760 to the present time.

- I. Mythical period ; from most ancient times, to about B. C. 200,<sup>10</sup> being the period of so-called pure Japanese medicine.
  - II. Introduction of Chinese and Korean medicine from B. C. 200 to A. D. 700.
  - III. Establishment of the University ; growth and decay of the Chinese school of medicine ; from the beginning of the VIIIth century to the middle of the XVIth century.
  - IV. Introduction of Western medicine and revival of the Chinese school ; from the middle of the XVIth century to the beginning of the present reign (1868).
  - V. State of medical affairs at the present time.
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I. MYTHICAL PERIOD ; FROM MOST ANCIENT <sup>247</sup>  
TIME TO ABOUT B. C. 200 ; BEING THE  
PERIOD OF SO-CALLED PURE  
JAPANESE MEDICINE.

Japanese historians, for the most part, unite in attributing the earliest notions of medical treatment possessed by the inhabitants of ancient Japan to Ō-na-muchi-no-mikoto,<sup>11</sup> the deity Great-Name-Possessor and Sukuna-hiko-na-no-mikoto, the deity, Prince Small-Name, two deities of the Shin-dai, or "Divine Age," of Japanese history, who lived, it is said, many hundred years before the Christian era,

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10. The years of the Christian era corresponding with those of Japanese chronology have been determined by the 紀元年表, Table of Japanese Chronology.

11. *Mikoto* as originally used probably meant little more than a title of exalted rank, but for sake of convenience it is here rendered deity, although it can hardly be said to resemble much in meaning the latter term.

and whose lives are written down in the ancient records of Japan. Before this, it is stated, and in the time of the first divine pair of Japanese mythology, Izanagi and Izanami,<sup>12</sup> the art of healing first had its origin. As however the knowledge of those most ancient times is but legendary and handed down by writers, the earliest of whom, whose works are still extant, wrote not earlier than the seventh or eighth century after Christ, and long after the introduction of Chinese and Korean literature into Japan, it will perhaps yet transpire that the notions of medical treatment, herein designated as purely Japanese, had their origin in lands beyond the Japan Sea.

Ō-na-muchi-no-mikoto was a descendant of Susa-no-wo-no-mikoto, brother of the Sun goddess, and son of Izanagi and Izanami, and was also known by several other titles.<sup>13</sup> He is thought by some to have been in reality a Korean warrior who had in early times crossed the sea to Japan.<sup>14</sup>

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12. According to Japanese mythology (*Kojiki*, Asiat. Soc. Trans.) all things sprang from chaos. The heavens and earth were formed first, following which, in the "Plain of High Heaven", three deities were born, and from a thing that "sprouted up like unto a reed shoot" two other deities came into existence, in all five, who were called heavenly deities. After these were seven generations of earthly deities, of which Izanagi and Izanami were the last, who were also the progenitors of the human race. That age which extended down to the time of Jim-mu Tennō, B.C. 640, was called the Shin-dai, or "Divine Age," during which a race of demi-god emperors, it is said, ruled Japan.

13. Utsushi-kuni-tama-no-mikoto, the deity, Spirit of the-Land-of-the-Living; Ō-kuni-nushi-no-mikoto, the deity, Master-of-the-Great-Land; Ashi-hara-shiko-wo-no-mikoto, the Deity-of-the-Reed-Plains; Yachi-no-mikoto, the Deity-of-Eight-Thousand-Spears.—(See Chamberlain's Translations of the *Kō-ji-ki*, Asiatic Soc. Trans., vol. x. Supplement, p. 67.

14. Ō-na-muchi-no-mikoto is now also looked upon as the god of marriage, and is so worshipped at Idzumo-no-Oyashiro, at which place all



To Ō-na-muchi-no-mikoto and Sukuna-hiko-na-no-mikoto,<sup>15</sup> it is stated in the *Nihon Sho-ki*, or Chronicles of Japan, and in the *Koku-shi-ryaku*, or Epitome of Japanese History, were entrusted the affairs of the land; and that being moved with great love for the people, they drove away evil spirits, gave remedies and charms against sickness, accidents, and ravages of insects, birds and beasts in cultivated lands, and also established methods of medical treatment upon which the people placed great reliance.

In the *Ko-ji-ki*<sup>16</sup> it is related that Ō-na-muchi-no-mikoto, coming one time upon a hare lying upon the ground and weeping with pain, whose clothing had been stripped off by a crocodile, and whose skin had split by reason of a wetting with salt water, and exposure to the heat of the sun, directed the hare as follows:

"Go quickly now to the river-mouth, wash thy body with fresh water, then take the pollen of the sedges growing at the river-mouth, spread it about, and roll about upon it, whereupon thy body will certainly be restored to its original state," following which directions the hare quickly recovered.

On another occasion, Ō-na-muchi-no-mikoto himself became the subject of medical treatment, the story of which, as related in the *Ko-ji-ki*,<sup>17</sup> is given below:

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the gods of the land are said to assemble annually in the tenth month (the Kami-nashi-no-tsuki, or month without a god), to arrange marriages for the coming year.

15. The deity Prince Small-Name, now worshipped at a temple in Go-jō-Machi, Kiyoto. The peculiarity of the names, Ō-na-muchi-no-mikoto, has led some to suppose that they represented the names of officers rather than the names of persons.

16. Chamberlain's Translation, p. 68.

17. Ibid, p. 70.

The eighty deities, the brethren of Ō-na-muchi-no-mikoto, desiring to slay him, because of the preference  
249 of the Princess Ya-kami for him, having counseled together, said to him :

“On this mountain there is a red boar. So when we drive it down, do thou wait and catch it. If thou do not wait and catch it, we will certainly slay thee.” Having thus spoken, they took fire, and burnt a large stone like unto a boar, and rolled it down. Then, as they drove it down and he caught it, he got stuck to and burnt by the stone, and died.

Thereupon her Augustness his August parent cried and lamented, and went up to heaven and entreated His-Divine-Producing-Wondrous-Augustness, who at once sent Princess Cockle-shell and Princess Clam to bring him to life. Then Princess Cockle-shell triturated and scorched her shell, and Princess Clam carried water and smeared him as with mother's milk, whereupon he became beautiful and wandered off.

In the *Shin-dai-ki* or Records of the Divine Age<sup>18</sup> it is stated that Sukuna-hiko-na-no-mikoto employed sand heated in sea-water over a fire to warm the back, and found the effect to be good; and that in the time of Ame-no-oshi-mi-mi-no-mikoto and of Ishi-kori-to-me-no-mikoto, infusions and decoctions<sup>19</sup> were first employed. The *Shin-dai-ki* further states that the sons of Ō-na-muchi-no-mikoto and Sukuna-hiko-na-no-mikoto were appointed to be attendant physicians and to encourage the growth of medical art; and that during the reign of the second emperor of this age great encouragement was given. Medical officers were appointed to make experiments with medicinal herbs upon monkeys, and also to dissect their bodies. From these dissections anatomy, it is said, became known. The results of the experiments, and the uses of medicines, were made known to the

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18. Section VII.

19. 木葉湯, decoction of leaves of trees, 草花湯, decoction of flowers of plants.

common people. Inquiries were also made as to the habits, general health, and longevity of the inhabitants of the land, from which, among other things, it was found that few lived to be over one hundred years of age.

During the several reigns of the so-called "Divine-Age," much, we are told by historians, was done toward the improvement of the hygienic conditions of the people, and of the methods employed in the treatment of their diseases, while the practice of medicine at court was accompanied by most encouraging results. On one occasion an empress of the 34th reign was taken with a <sup>250</sup> most violent disorder, which was, however, cured by the court physician, who after having felt the four pulses, took from his bag, which he carried on his back, some medicine which he placed in the mouth of the empress, who although at once seized with great pain, followed by vomiting, was very soon after relieved and in eight days completely recovered.<sup>20</sup>

The character of the remedies said to have been employed in early times, and before the Christian Era, may be judged from the following list of Japanese names as given by Mr. Kaku Kashiro,<sup>21</sup> the Latin equivalents having been obtained from the *Nippon-shoku-butsu-mei-i*, or Nomenclature of Japanese Plants, by Professor Matsu-mura,<sup>22</sup> and Mr. F. Porter Smith's Notes on the *Materia Medica of China*.<sup>23</sup>

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20. 皇國醫事沿革小史, Short History of Japanese Medical Progress.

21. 日本植物名彙, Tokiyo, 1884.

22. Shanghai, 1871

24. In the trans-iteration of these names the full sound of each syllable of the original is given.

ANCIENT JAPANESE NAME.	CHINESE NAME.	SYSTEMATIC NAME.
1 Yamahiragi <sup>23</sup>	黃芩	Scutellaria macrantha, <i>Fisch.</i>
2 Ohoseri ....	當歸	Ligusticum acutilobum, <i>Sieb. et Zucc.</i>
3 Yehiyasu ....	芍藥	Paeonia albiflora, <i>Pall.</i>
4 Arinohifuki ...	桔梗	Platycodon grandiflorum, <i>D. C.</i>
5 Kurara ...	苦參	Sophora angustifolia, <i>Sieb. et Zucc.</i>
6 Sahohime .....	地黃	Rehmannia lutea, <i>Maxim.</i>
7 Kataboso .....	半夏	Pinellia tuberifera, <i>Tenore.</i>
8 Okera .....	朮	(蒼朮) <i>Atractylis ovata, Thunb.</i>
9 Naruhajikami .	蜀椒	Xanthoxylum alatum.
10 Matsuhodo ...	茯苓	Pachyma cocos.
11 Kihada .....	黃蘗	Phellodendron amurense, <i>Rupr.</i>
12 Yamakagami ..	白檉	Vitis serjaniaefolia, <i>Bunge.</i>
13 Tsuchitara ...	靈活	Angelica inaequalis, <i>Maxim.</i>
14 Yaharakusa ...	黃芪	Ptarmica sibirica, <i>Hoff, et Schult.</i>
15 Hikimohitar ...	細辛	Asarum sieboldi, <i>Miq.</i>
16 Ishi-ayame ...	石菖蒲	Acorus gramineus, <i>Ait.</i>
17 Sanenomi .....	五味子	Kadsura japonica, <i>L.</i>
18 Yamakusa ...	黃連	Coptis anemonaefolia, <i>Sieb. et Zucc.</i>
19 Hirimushiro ...	蛇床子	Selinum japonicum, <i>Miq.</i>
20 Ohobako .....	車前子	Plantago japonica <i>Fr. et Sav. (seed)</i>
21 Nenashi ..	菟絲子	Cuscuta japonica, <i>Chois.</i>
22 Hirumo ...	蛭藻草	Potamogeton polygonifolius, <i>Pourr. (?)</i>
23 Ihonuki ...	陸南	Phytolacca acinosa, <i>Roxb. var. esculenta,</i> <i>Maxim.</i>
24 Kumano <sup>1</sup> or Nikota ... }	人參	Panax Ginseng, <i>C. A. Mey.</i>
25 Ominakadzura.	薊芎	Comoselinum univittatum, <i>Turez.</i>
26 Karatachi .....	枳殼	(枳) Citrus fusea, <i>L.</i>
27 Yorohikusa ...	白芷	Angelica anomala, <i>Pall.</i>
28 Itachikusa .....	連翹	Forsythia suspensa, <i>Vahl.</i>
29 Hotot-ura ...	百部根	Roxburghia sessilifolia, <i>Miq. (root).</i>
30 Hirayomogi ..	茵陳	Artemesia capillaris, <i>Thunb.</i>
31 Mitakara <sup>24</sup> .....	石斛	Dendrobium moniliforme, <i>Sav.</i>
32 I <sup>25</sup> .....	熊胆	(Gall of the bear (?) ).
33 Hizuma .....	豬蹄	(Hoof of the hog (?) ).
34 Karasufugu ...	封干	Pardanthus chinensis, <i>Ker.</i>
35 Uruki .....	夏枯草	Brunella vulgaris, <i>L.</i>
36 Hajikami ...	薑	Zingiber officinale, <i>Roscoe.</i>
37 Nirakusa .....	韭	Allium odorum, <i>L.</i>

As Mr. Kaku Kashiro's comments upon the condition of medical knowledge in most ancient times are most interesting, they are reproduced here in translation. He says:

24. Sometimes called "Sukuna-hiko-na's Remedy," and used in all diseases.

25. It is possible that this is identical with Ikusa, which is rendered in one manuscript 藺 (the rush of which matting is made).

Considering the most ancient records, we find that the number of medicines discovered by tasting and experiment to have amounted to only thirty-seven, and that these mostly consisted of the roots of herbs and bark of trees. It may be possible that with these few remedies the ancients established the rules of prescribing for all diseases. In the *Shōhon-Dai-dō-rui-shū hō*<sup>26</sup> (Abridged "Collection of the Methods of the Dai-dō Era" A.D. 806-809), we find the following: "The Government from ancient times has established three methods for prescribing, handed down from the 'Divine Age,' each of which has four divisions or rules,—afterwards increased to thirteen according to the word of Sukuna-hiko-na-no-mikoto." In each division thirteen medicines were named. It is claimed by some that the account which places the number of medicines used in most ancient times at thirty-seven cannot be correct, as there are other medicines not mentioned in this list, but which are found in the various prescriptions said to have been handed down from Ō-na-muchi-no-mikoto and Sukuna-hiko-na-no-mikoto. In the face, however, of such clear statements as we find in the *Rui-shū-hō*<sup>27</sup> (Collection of Methods), and taking into consideration the simplicity of primitive times, there seems no sufficient ground for such claims; while it is not improbable that these medicines, thirty-seven in number, were all that were known to our ancestors. I have already quoted from the *Shin-dai-ki*<sup>28</sup> Records of the Divine Age, that in the reign of the second emperor of that age, Sukuna-ō-ku-me-no-mikoto and seven other medical officers, having 252 travelled in various directions throughout the land, returned after four years with seventy-eight kinds of roots of herbs and bark of trees, which they offered to the emperor. This was several hundred years after the time of Ō-na-muchi-no-mikoto, and if at this time there were only seventy-eight different kinds in all, it can hardly be claimed that 37 is too small a number to represent the different medicinal substances employed in still more remote times. The reason for mentioning the several hundred prescriptions found in the *Dai-dō-rui-shū-hō*,<sup>29</sup> or Collection of Methods of Daidō Era, and the *Shin-i-hō*,<sup>30</sup> or Methods of the 'Divine Age,' as though they were prescribed by Ō-na-muchi-no-mikoto and Sukuna-hiko-na-no-mikoto, is easy of explanation, when we remember that these also contain the recipes of the descendants of these personages. At the end, however, of the 'Divine Age' there were some hundreds of remedies employed and obtained from birds, beasts, reptiles (mostly incinerated),

26. 鈔本大同類聚方.

29. 大同類聚方.

27. 類聚方.

30. 神遠方.

28. 神代記.

minerals, stones and clay. All of these are found in Japan, and none of them are imported. These medicines were obtained in nearly all the provinces, but Idzumo, Awamine, Ietsu, Kusakine, Keshine, and Tsukushi, were most celebrated.

Medical practice in most early times was undoubtedly rude and unscientific, for no search was then made after the cause of disease, nor were other than empiric remedies employed in its treatment. Medicines were prescribed simply for symptoms; cold, for instance, was treated with Wake-yaku<sup>31</sup> (Wake's Medicine), insanity with Tosa-yaku<sup>32</sup> (Tosa Medicine), diarrhoea with Awaji-yaku<sup>33</sup> and Hiuga-yaku<sup>34</sup> (the Awaji and Hiuga remedies). In those days the practice of medicine was already a recognized profession, for in the *Shin-dai-ki*,<sup>35</sup> or Records of the Divine Age, section 7, it is recorded that Ō-na-muchi-no-mikoto and Sukuna-hiko-na-no-mikoto conducted experiments in medical art and made it the profession of their descendants; and in the 26th section it is stated the 16th emperor had fifty-two sons, of whom twenty were appointed searchers for medicinal plants, were taught the rules for medical treatment laid down by Ō-na-muchi-no-mikoto and Sukuna-hiko-na-no-mikoto, and were sent to various provinces under the title of Hase-daki-no-kami. They were also given the name of Hiko-no-mikoto coupled with the name of the province to which they were sent. In section 28 it is related that the 20th emperor on one occasion invited all his sons to a banquet, at which each was asked to state the object of his life. Whereupon certain replied that they desired to become medical officers; others, to become officers for general education or religious instruction; others, commanders of military or naval forces, and other, officers charged with the increase of the people. The emperor, pleased with their desires, permitted them to assume the offices they had chosen.

253 In section 41 it is stated that Jim-mu Tennō<sup>36</sup> on a certain occasion called his three sons to him, and enquired of them what life work they preferred most to follow, to which one, whose name was Ta-gishi-mimi,<sup>37</sup> made reply, asking to be sent to Tō-koku (eastern part of Japan), there

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31. 和氣藥.

32. 土佐藥.

33. 淡路藥.

34. 日向藥.

35. 神代記.

36. Jim-mu Tennō was the first of the emperors of the Jin-dai or "Human Age" and he succeeded the seventy-second emperor of the "Divine Age." He is said to have ascended the throne in the year 660 B. C. and to have been the ancestor of the present reigning emperor.

37. 手研耳.

to become a physician. Thereupon he was appointed Hase-daki-no-kami,<sup>38</sup> whose palace was built in Mount Kukuta<sup>39</sup> in the province of Chujinoku (Iwaki); another, named Kamu-ya-i-mimi,<sup>40</sup> asked to go to Sai-koku (the western part of Japan) and become a physician there. So that he too was appointed Hase-daki-no-kami, and had his palace built in Mount Aso.<sup>41</sup> Thus we see that in these days medical art was held in high esteem, and was practiced almost exclusively by the relatives of the emperor and by nobles, and that persons of lower rank were only allowed to become physicians after having passed middle age, and even then, only such as were possessed of great skill and experience, in proof of which a perusal of section 26 must be conclusive. Therein it is stated that the 12th emperor of the "Divine Age" commanded that the laws of Ame-no-masu hiko<sup>42</sup> should be amended, and further, that men unable to pursue other avocations should be employed as diggers of medicinal roots, and the old men as physicians. In section 41 it is stated that in the reign of Jim-mu Tennō persons of both sexes, who had been infirm from birth, were ordered to attend and feed the monkeys, and to make experiments with medicines, and after the age of fifty were permitted to become physicians.

In primitive times the four elements recognized by the ancients—wind, fire, water, and earth—were used to explain the phenomena of life in the human body. In section 19 of the "Records of the Divine Age",<sup>43</sup> the 2nd emperor, represented as giving encouragement to medical art, says: "It is discovered that by the great skill of the heavenly gods the human body is made, consisting of the four elements, wind, fire, water, and earth, and by their combination to possess the body with the soul: and that further, the methods of searching for the causes of disease by feeling the situation of the four pulses, and determining whether they be good or bad, have been fixed."

It is curious to find that this agrees with the opinion of the philosophers of Egypt and Greece, who originated western science and who also based their theories of matter upon the existence of four elements.<sup>44</sup>

38. See Hase-daki-no-kami, preceding page.

39. 菊多 also name of a county (kōri).

40. 神八井耳.

41. In Iiigo there is still a temple called Aso-no-miya.

42. 天之益人.

43. 神代記.

44. Hippocrates regarded the body as composed of four elements differently combined in different individuals, and derived from them the four humors of the body,—blood, phlegm, bile and black bile, from which again were derived the four temperaments.—(Am. Cycl.)

To this time dates back the commencement of the study of anatomy and physiology, for in the same section we find these words; "The causes of internal and external diseases are explained, the form of the bones in man and woman, the position of the bowels and intestines are discussed, and the good and bad effect of food and drink determined, etc." Moreover, as previously mentioned, reference is made to the anatomy of the monkey, although it does not appear that dissections of the human body had then yet been made. Monkeys were also kept for experiment to find out the effects of various medicines upon living animals.

During this period, the modes of diagnosing disease were very simple, only three methods,—observation, question, and touch,—being resorted to. Although the touch was considered an important means of diagnosis, it was rarely made use of in reference to the pulse, but rather limited to ascertaining the heat, hardness, or softness of the surface of the body. Hence it is, that the symptoms of sickness made mention of in the medical treatises of ancient times, were chiefly in relation to the color, temperature (hotness or coldness), the dryness or moistness, hardness or softness, of the face, and of the skin of the body, the violent beating of the heart, the condition of the respiration—whether easy or difficult, cough, expectoration—its appearance and odor, the condition of the mind—whether tranquil or not, presence of pain, uneasiness, headache or heaviness of the head, the condition of sleep, presence of delirium, numbness, cramp or convulsion, obstruction of the senses, condition of taste and smell, the presence of a  
255 coating on the tongue, its color, dryness or moistness, presence of anger or thirst, vomiting, diarrhea, frequency of stools and their nature, quantity, of the urine, and its denseness or lightness of color; by which simple symptoms the ancients decided the nature of disease. The usual mode

Dr. K. N. Macdonald in his "Practice of Medicine Among the Burmese," states that the physicians of Burma have held from ancient times that "the constitution is made up of four *dâts* or elements:

"1. The *Pat-ta-wee*, or earth *dât*, consisting of the flesh, bones, feces, etc.

"2. The *Ta-zaw*, or fire *dât*, consisting of the heat, both external and internal, of the animal body.

"3. The *Ah-bwa*, or water *dât*, consisting of the blood, sweat, urine, marrow, and other fluids.

"4. The *Wah-yaw*, or windy *dât*, consisting of the wind which is belched from the stomach, etc.

"Besides the above four *dâts*, belonging to the human constitution, there is a fifth, called the *Ah-ka-tha*, or Heaven *dât*, which keeps all the other *dâts* in motion."



of administering medicine was in the form of infusions or decoctions, alternated with powders; the former usually taken whilst hot or warm, and the latter generally with cold water rather than hot. Pills were not often given, and plasters, liniments, collyria and lotions seldom employed, although quite well known, preference being given to internal remedies even in surgical cases. Incision, puncture with a kind of thorn, cauterization with the moxa, (differing, however, from the modern Japanese method, and resorted to in healing small wounds or sores on the body performed by placing a live coal, the roots of plant, or tree, upon the injured part, which was followed by inflammation, suppuration, and usually a cure), and compression by bandages were known, yet the art was rude indeed and practically very little employed.

In the record just quoted we find it stated, that, in the time of Jimmu-Tennō, blind and dumb were made pupils of physicians, and taught the arts of manipulation of the abdomen and acupuncture with gold needles, and were permitted to practice the former art after the age of thirty, and the latter after having passed seventy. From which it appears that manipulation, or massage, and acupuncture were known and employed even in those most remote times.<sup>45</sup>

The following few examples of ancient methods of medical treatment will give an idea of some of the most important of these modes of dealing with physical disorders. The Japanese names are given as they occur in ancient records, the modern Chinese names set opposite are of the author's own rendering and are based upon the authority of the *Wa-miyo-sho*,<sup>46</sup> *Yen-gi-shiki*,<sup>47</sup> *Iin-butsu-shiki-mei*,<sup>48</sup> *Wa-miyo-hon-zo*,<sup>49</sup> *Yamato-hon-zo*,<sup>50</sup> *Hon-zo-kei-mo*,<sup>51</sup> and *Wa-kan-sansai-dzuyē*.<sup>52</sup>

45. In the reign of the Empress Ko-ken, A. D. 749, gold was presented to the court from Oshima, and though this is considered to have been the first that was found in Japan, yet it is mentioned in the above record, that in the 10th reign of the "Divine Age" gold was presented to the reigning empress.

46. 和名抄, Explanation of Japanese Words.

47. 延喜式, Ceremonials of the Yen-gi Era (A. D. 901-922).

48. 品物識名, Dictionary of Names of Things.

49. 和名本草, Japanese Botany.

50. 大和本草, Botany of Yamato (Japan).

51. 本草啓蒙, Botany for Beginners.

52. 倭漢三才圖會, Encyclopedia of the Universe (Japanese and Chinese).

14 *Whitney:—History of Medical Progress in Japan.*

For all kinds of colds and catarrh of the organs of respiration and digestion, sweating was induced, and medicines for strengthening the stomach were exhibited. In ordinary colds the following named medicines were used:—

256 Ominakadzura	芍藥	Conioselinum univittatum, <i>Turcz.</i>
Hosogumi	半夏	Pinellia tuberifera, <i>Tenore.</i>
Hajikami	薑	Zingiber Officinale, <i>Roscoe.</i>
Tamakawa	桂皮	Cinnamomum Loureirii, <i>Nees.</i> (bark).

For catarrh of the digestive organs the following medicines, which excite sweating, are of bitter taste, and strengthen the stomach, were given:

Yeshiyasu	芍藥	Paconia albiflora, <i>Pall.</i>
Naruhajikami	蜀椒	Xanthoxylum alatum.
Mekusa	薄荷	Mentha arvensis, <i>L. var. vulgaris, Benth.</i>
Hirarane	黃芩	Scutellaria macrantha, <i>Fisch.</i>
Kafudzu	橙	臭橙 Citrus bigaradia, <i>Dunham.</i>
Yeyamikusa	龍胆	Gentiana scabra, <i>Bunge.</i>

For catarrh of the respiratory organs when there is great coughing, the following were used in mixture.

Makusune	葛根	Pueraria Thunbergiana, <i>Benth.</i> (root).
Matsuhodo	茯苓	Pachyma cocos.

Thus for instance, in volume XVI. of the Collection of the Methods of the Daido Era,<sup>53</sup> it is directed that Wake-yaku,<sup>54</sup> which includes the above medicines, is to be used in colds and light fevers, also for severe colds and for loss of appetite. The following five medicines were directed to be given in decoction:—

Makusune	葛根	Pueraria Thunbergiana, <i>Benth.</i> , (root).
Ominakadzura (芍藥)		Conioselinum univittatum, <i>Turcz.</i>
Hosogumi	半夏	Pinellia tuberifera, <i>Tenore.</i>
Hajikami	生姜	Zingiber officinale, <i>Roscoe.</i>
Tamakawa	桂皮	Cinnamomum Loureirii <i>Nees</i> , (bark).

For diarrhoea, Ku-mi-ken-yaku<sup>55</sup> (bitter stomachics), Shu-ren-yaku<sup>56</sup> (astringents), or Ho-setsu-yaku<sup>57</sup> (emollients) were employed; the names of some of which were:—

53. 大同類聚方.

54. This was the original prescription of Sukuna-hiko-na-no-mikoto and handed down through many generations to Wake Inari of Bizen.

55. 苦味健胃藥.

56. 收斂藥.

57. 包攝藥.

Karatachi	枳殼	Citrus fusca, <i>Smith</i> .
Arinohifuki	梗桔	Platycodon grandiflorum, <i>D. C.</i>
Yamaseri	當歸	Ligusticum acutifolium, <i>Steb. et Zucc.</i>
Mirarane	細辛	Asarum sieboldi, <i>Miq.</i>
Hirarane	黃芩	Scutellaria macrantha, <i>Fisch.</i>
Okerane	蒼朮	Atractylis ovata, <i>Thumb.</i>
Kurarane	苦參	Sophora angustifolia, <i>Sieb. et Zucc.</i>
Afuchikawa	苦楝皮	Melia azedarach, <i>L.</i> (root).
Nikota	人參	Panax Ginseng, <i>C. A. Mey.</i>
Yeyamikusa	龍胆	Gentiana scabra, <i>Runge.</i>
Fushikurumi	正倍子	Rhus semi-alata, <i>Smith.</i> (Nut galls).
Makuzune	葛根	Pueraria Thunbergiana, <i>Benth.</i> , (root).
Matsuhodo	茯苓	Pachyma Cocos.

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For urinary diseases the following were used :

Momonohana	白桃花	Prunus persica, <i>Benth et Hook.</i> (?) (flower).
Mubarami	榮實(即野薔薇實)	Rosa multiflora, <i>Thumb.</i> (seed.)

These medicines have diuretic properties.

For pain in the bowels arising from indigestion the following stomachic analgesic medicines were used :—

Kafudzu	臭橙	Citrus begaradia, <i>Dunham.</i>
Hajikami	生姜	Zingiber officinale, <i>Roscoe.</i>
Mikurine	香附子	Cyperus rotundus, <i>L.</i>
Masumi	杜仲	Eunonymus japonicus, <i>Thumb.</i>
Mirarane	細辛	Asarum sieboldi. <i>Miq.</i>

For dropsy, diaphoretic and diuretic medicines, as—

Mirarane	細辛	Asarum sieboldi, <i>Miq.</i>
Kakuma	麻黃	Cannabis —————?

Also cathartics, and other medicines to reduce swelling (resolvents), were employed.

The following are examples of medicines which were employed in general dropsy.

Ōshinone	大黃	Rheum undulatum, <i>L.</i> (root).
Karatachi	枳殼	Citrus fusca, <i>Smith.</i>
Momonohana	白桃花	Prunus persica, <i>Benth. et Hook.</i> ? (flowers).

These medicines are directed to be administered in decoction.

In all kinds of fever the treatment consisted mainly in the administration of diaphoretics, the principal remedy being Kawa-yanagi-kawa 水楊皮, bark of the river willow.

16 *Whitney:—History of Medical Progress in Japan.*

In the treatment of inflammations of the conjunctiva, inner ear, nose, or any mucous membranes 解凝收歛性品, resolvents and emollients were administered internally, or applied externally to the surface, and were represented by—

Shiraishi 石膏 Gypsum cake.

Yamashiho 芒硝 Saltpetre.

Tousu 礬石 (即明礬) Alum.

258 For diseases of the skin, such as herpes parasiticum, in addition to the three above mentioned remedies, Hōkuchi 硫黃, Sulphur, was employed, and with the others was sometimes also used externally as an ointment. The treatment of ulcers varied but little from the above.

Besides the methods of treatment above briefly described, there were other means resorted to for the cure of disease, one of which was that of incantation.

The treatment of disease by bathing in the water of hot springs, was introduced by Ō-na-muchi-no-mikoto and Sukuna-hiko-na-no-mikoto, for on a certain occasion it is related, Ō-na-muchi-no-mikoto becoming himself ill, and after consulting with Sukuna-hiko-na-no-mikoto, bathed in a hot spring, whereupon he soon recovered, and afterwards, whenever in their travels these personages came upon good soil, they established hot springs; which was the beginning of this kind of treatment in Japan. A daughter of Ō-na-muchi-no-mikoto named Taka-tsu-hime-no-mikoto, who was afflicted with a disease of the eyes, was also cured by the use of the water of hot springs.

Cold water baths are said to have been used during the illness of the Emperor San-jo (A.D. 1012-16) described in *Ō-kagami*,<sup>58</sup> and were also used by Kiyomori when attacked by a fatal fever, references to which treatment are made in several works as a remnant of primitive modes of treatment; from which we know, that in early times cold baths were used in acute fevers. After the time of Kiyomori (A.D. 1181) it is stated in the *Hon-chō-i-dan*,<sup>59</sup> or Talks upon Japanese Medicine, cold baths were never used.

In taking into consideration the foregoing statements in regard to the employment of remedies in most remote times, and of the medical knowledge of those times, it should be borne in mind that the histories, from which

58. 大鏡 Great Mirror.

59. 本朝醫談.

these accounts are taken, are, for the most part, legendary, and that not until several centuries after the beginning of the Christian Era does Japanese history lose its mythical character and give evidence of authenticity. These statements, nevertheless, are not without interest, and have an important bearing upon the subject.

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## II. INTRODUCTION OF CHINESE AND KOREAN 259 MEDICINE; FROM B. C. 200 TO ABOUT A. D. 700.

The time at which Chinese and Korean medicine first became known in Japan is not clearly stated. Subsequent however to the period of Japanese Medical History already described, a great and remarkable change, evidently the result of foreign intercourse, took place in the accepted theories of the causes of disease, and in the practice of medicine. The beginning therefore of the introduction of these foreign systems of medicine may be set down as having occurred at a time no less remote than the second or third century B. C., two centuries after Hippocrates and over four hundred years after the "Divine Age" of the demi-god emperors of Japan had come to a close.

Ancient Japanese history is not without its legends of foreign intercourse at a period anterior to that above, and mention of which is made in the "Chronicles of Japan,"<sup>1</sup> wherein it is stated that in the reign of the fourth emperor of the "Divine Age" an ambassador, named Uteru, from Akasuhide, emperor of Oroshi,<sup>2</sup> landed in the province of Yechigo.

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1. 皇國醫事沿革小史, Short History of Japanese Medical Progress.

2. 俄羅斯.

The first mention of the arrival of any foreign physician in Japan is found in the legend repeated by Kaempfer<sup>3</sup> in his discussion of the different theories advanced in his day as to the probable origin of the Japanese race.

In the reign of the Emperor Kōgan (B. C. 214 to 158) a Chinese physician, accompanied by three hundred young men and as many young women, landed on the shores of Japan. The object of this physician in leaving his native land in such strange company, it is stated, was to escape from the power of a cruel tyrant and to establish in Japan a colony of his own people, among whom he might pass away his days in peace. In order to accomplish this purpose, he represented to the emperor that a medicine was to be obtained in Japan which possessed the wonderful virtue of giving immortality to those who might be subjected to its influence. So tender, however,  
260 and of such a singular structure were the plants from which this medicine was obtained, that they would lose their virtues if touched by other than chaste and pure hands, and that it would be necessary, to ensure the success of his proposed mission, that he should be accompanied in his search by such a band of young men and women.

Kaempfer adds, that in the province of Kii places are still pointed out where this physician is said to have landed, and where he afterwards settled with his colony, and also the remains of a temple erected in his honor, "for having brought over from China good manners and useful arts and sciences."

Later, in the 65th year of the reign of Sūjin Tennō, B. C. 33, it is recorded that one Sonakashichi arrived in

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3. Kaempfer's Japan, p. 82.

Japan from Mimana,<sup>4</sup> one of the kingdoms into which Korea was in ancient times divided. Previous to this, however, other foreigners had come to Japan and some had become naturalized, while Japanese had gone abroad, some of whom returning had also brought information of foreign manners, customs, and sciences with them.

It is stated in the Chinese work 東國通鑑, or Outline History of the Eastern Country,<sup>5</sup> that in the year corresponding to A.D. 11 the Japanese came over and invaded the frontiers, and that thirty-seven years later one Koko, of Japanese birth, was sent from Shiragi<sup>6</sup> to Bakan<sup>7</sup> with tribute. Koko was also called Lord of the Gourds, because he first brought gourds from Japan.

It is probable that the foreign invasion of Korea by the Empress Jingō, in or about the year A.D. 201, contributed much toward the gradual introduction of Chinese and Korean medical learning into Japan. During this period, and also previous thereto, it is stated that it was not an uncommon thing for sons of the Korean king to become the medical instructors of the sons of the Japanese emperors, records of the teachings of whom are found in the histories of those times. Among the most noted of these Koreans were Amanohihoko, who came to Japan in the year B.C. 27, Yudzuki no kimi,<sup>261</sup> who came in the year 283, and Atoki in the following year. Wani, who arrived in Japan about 283, brought with him the *Ron-gō*<sup>8</sup> or "Miscellaneous Conversations" [between Confucius and his disciples], and the *Sen-j-mon*,<sup>9</sup>

4. Or Ninna. 5. 崇神天皇記, Records of the reign of Sōjin Tennō.

6. One of the ancient Kingdoms of Korea.

7. A town on the borders of China, where the tribute-bearers from Korea were received.

8. 論語

9. 千字文.

Classic of a Thousand Characters. In the reign of Inkiyō Tennō, 412-453, an ambassador was sent to Shiragi for a physician to attend the emperor, who was unable to walk by reason of a disease in the legs.<sup>10</sup> In the year 413, and in compliance with this imperial request, the king of Shiragi sent Kinhachin and Kankibu, two physicians, as ambassadors and bearers of presents to the Japanese Court. Through the skillful efforts of these physicians the emperor soon recovered, of which latter it is recorded that during his reign the best foreign methods of treatment of disease became known, and together with the ancient Japanese methods were widely employed.

In the 14th year of his reign, 553, Kinmei Tennō sent an ambassador to Kudara, one of the ancient divisions of Korea, requesting the king of that country to send a physician to Japan with various kinds of medicines, it being the hope of the emperor that the threatened return of an epidemic, which on a previous year had carried off many of the youths of the land, might thereby be averted.

The king of Kudara accordingly sent, in the following year, a professor of medicine<sup>11</sup> named Nasotsu Yurioda, accompanied by two botanists, or searchers for medicinal plants, Setoku Hanriho and Kotoku Seiyuda, from which time the medical learning of Kudara was taught, and many of its doctors and medical botanists found employment in Japan. At this time the *Sō-mon*,<sup>12</sup> *Re-su*,<sup>13</sup> *Nan-*

10. Kakke (?)

11. 醫博士, I-hakase.

12. 素問, "Questions of Soko; containing the answers of an all-knowing God to Hoanti, the son of Hohu, the founder of China, concerning subjects philosophical, physiological and anatomical."—(Am. Cycl.)

13. 靈樞, A treatise on internal maladies and the practise of acupuncture.



*kiyo*,<sup>14</sup> and *Sho hin*,<sup>15</sup> were appointed to be read by medical students.

Ten years later, one Chisō, a grandson of the Emperor 262 Sho-en<sup>16</sup> of China, brought to Japan and presented to the emperor 164 volumes of a work called *Yaku-sho-mei-do-dzu*.<sup>17</sup> During this reign Buddhism was also introduced, as well as the arts of almanac-making and divination. After this the study of botany became quite popular, and it is mentioned in history that the Empress Suiko (A.D. 593–628) and Emperor Tenchi (668–671) both studied botany and observed the custom of collecting medicinal plants on the 5th day of the 5th month of each year.

During the reign of Bitatsu Tennō, in the fourteenth year, a dire scourge fell upon the people who were afflicted with a skin-eruption, by reason of which many perished. This was believed by some to have been the result of the introduction of Buddhism, whilst by the common people it was thought to be a punishment sent on account of the burning by imperial command of a Buddhist idol. After this, and in the same year, one of the court officers having suffered from this disease, was permitted to pray to Buddha for healing, which, it is said, was the first time mentioned in Japanese history of permission being granted anyone to invoke the healing power of Buddha. Soon after, it became quite a common thing among the people to employ charms against disease, or to offer prayers for its cure.

Priests then performed the double function of priest

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14. 難經, On difficult diseases: containing solutions of eighty one doubtful questions.

15. 小品, A collection of miscellaneous prescriptions;

16. 照淵. 17. 樂善明堂圖, On Medicine and Acupuncture.

and doctor, and it was not uncommon, whenever the emperor was taken ill, to erect by imperial command a temple, and place therein an image of some deity for worship.

Medical priests soon became quite numerous, and in the reign of the Empress Kōken numbered at court one hundred and sixteen.

In the 10th year of the reign of the Empress Suiko (602), a priest named Kuwanroku brought to Japan works on almanac-making, astronomy, geography and the art of making armor, and was given charge of several students, one of whom, Yamashiro no omi Hinami, after having first studied the art of armor-making for several years, applied himself entirely to the study and practice of medicine and became famous in his profession.

263 In the 15th year of this reign (607) one Ono-no-Imogo, a woman of rank, brought back from China the *Shi-kai-rui-ho*,<sup>18</sup> a universal encyclopædia of medical treatment of 300 volumes.

In the 30th year of the same reign, 622, two priests,<sup>19</sup> Keisai and Keiko, and two physicians, Keijitsu<sup>19</sup> and Fukuin, who had been sent to China in a former year, having returned, reported to the empress the great progress being made by the Japanese students then pursuing their studies in China.

A few years later, in the reign of Jomei Tennō, (631), Keijitsu was again sent to the country of Tō (China) to continue his studies of the medical sciences of China.

Chinese medicine seems to have flourished during this time, and especially during the reigns of Empress Suiko

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18. 四海類聚方.

19. A native of Kudara (in Korea).

and her successor, while Korean medicine became less and less popular.<sup>20</sup>

During the reign of Suiko Kōgō students were first sent abroad, and bureaux for the distribution of medicines and food to the poor were first established.

The knowledge of anatomy,<sup>21</sup> physiology and therapeutics possessed by the physicians of the middle part of the period under consideration, has been summed up in the Short History of Japanese Medical Progress,<sup>22</sup> the substance of which is as follows: The internal organs or viscera, according to Takenouchi,<sup>3</sup> were eight in number, namely—*fugushi*, the lungs; *hokura*, the heart; *kimo*, the liver; *i*, the gall; *ichibuku*, the stomach; *yogoshi*, the spleen (?); *murato*, the kidneys; and *kusowata*, the intestines. The<sup>264</sup> lungs are in the upper part of the thoracic cavity; they cover the heart, are dependant; they also lie adjacent to the gullet and are divided into five lobes, and contain within convoluted vessels. The color of this viscus is greenish black; and it is the organ of respiration. The

20. The terms "Chinese medicine" and "Korean medicines" are used here and elsewhere rather to denote two of the sources from which the Japanese received their medical knowledge than to distinguish separate schools of medicine.

21. The word *kaibo*, to dissect, was first used, it is said (Tokio Medical News, 1884, p. 887), in the *Rei-su* 靈樞 (see p. 261). In the *Yū-riyaku-ki* 雄略記, or History of the Period, A.D. 457-479, it is mentioned that the Emperor, upon hearing of the death of Princess Tōta-hata, who had committed suicide by drowning because she had been subjected to a most painful suspicion, ordered an examination of the body to be made, whereat only a sack containing some water and a stone was found, and the innocence of the deceased princess thereby established. This it is said is the first record of a post mortem examination made upon the human body.

22. 皇國醫事 | 一史.

23. Prime Minister of Empress Jingō.

heart lies immediately behind the left mamma; its shape is like that of a bottle gourd (*Cucurbita lagenaria*); it is purple in color, and has a cavity within, which contains blood, and is provided with a middle wall or partition. It is the root of blood vessels. The liver is in the right side of the chest and is divided into two dependant lobes; its color is yellowish black. It is flat and hollow and covers the gall. There is a hole in it which connects with the heart, and also many other holes in it leading outward. The gall lies just outside of the liver. It is of a green color, and in form like the root of the 春蘭 (*cymbidium* sp.?). It contains within it a bitter tasting fluid of yellowish color. The stomach lies inwardly at the base of the spleen; its figure is like that of a stone jar (*kame*), and its color is white. It receives the food which comes down the gullet, and digests it, while below, it reaches to the intestine. In women it creates blood, while its water becomes urine (?). The spleen is on the left side of the belly; being above the stomach, its color is like that of the *kiri* (*Paulownia imperialis*), and it contains air. The kidneys are dependant, one on each side of the vertebral column; they have convoluted vessels within, and bind together fibres or tissues; above they reach to the liver. The intestine extends from the upper part of the navel downward with convolutions; it is long and bulky, and of somewhat greenish white color. It contains food within, and its extremity reaches to the anus. The first beginning of the formation of the human body is *ki* (氣), vital spirit or air,<sup>24</sup> and *sui* (水) water. These two make first the fibre, or tissue, and blood, then muscles and flesh, vessels, bones, internal organs, the four limbs,

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24. Vapor or breath,

outer skin, nose, mouth, eyes, ears, hairs, fingers and toes, and reproductive organs. The air (or vital spirit) enters through the mouth and nose to the inner organs, where it mixes with water, then ascends to the head, where it enters, minutely divided, into the main trunks of the blood vessels, circulates through the extreme parts of the body, and finally returns and stops in the inner organs. The water enters through the mouth in the food and <sup>265</sup> drink to the inner organs, and with the air, or vital spirit, into the main trunks of the blood vessels, where taking up color it becomes blood and nourishes the bones, while that portion which goes out toward the skin is without color and becomes *midsusune* (lymph?).

According to the same authority the constant circulation of air, or vital spirit, and water is the condition of health, while any obstruction whereby the circulation is impeded is the condition of disease.

In the treatment of disease eight propositions<sup>25</sup> and

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25. According to Dr. Macdonald (see page 254) the following eight propositions and eight rules (?) relative to the action of the several elements in the system formed a part of the pathology of the ancient Burmese.

1. If the earth-element increases and the fire element is affected; all the other elements are totally destroyed.
2. If the fire-element increases and the fullness in the stomach continue, all the other elements are destroyed.
3. If the wind-element increases and the liver becomes disordered, all the other elements are destroyed.
4. If the liver increases and the wind-element becomes established, the other elements will be completely destroyed.
5. If the heaven-element increases and the wind-element remain, all the other elements are destroyed.
6. If the fire-element increases and the heaven-element becomes established, all the other elements will be destroyed.
7. If the water-element increases and the heaven-element becomes established, all the other elements will be totally destroyed.

eight rules were held, but what these propositions and  
 266 rules set forth or directed, is not now known. The  
 causes of disease were believed chiefly to be due to  
 differing conditions of the air, or vital spirit, and water  
 which entered the system and which were called the  
 roots of disease. Cold, fever and ague, for instance, it  
 was held, were caused by impure air. The principles of  
 treatment were embodied in a number of general pro-  
 positions, wherein ideas of obstruction, congestion, tume-  
 faction, increased or diminished action and loss of tonic-  
 ity are expressed, and the use of remedies of antagonistic  
 properties to combat these conditions is recognized.

Therapeutically medicines were divided into classes,  
 according to their characteristics of smell, taste, and  
 weight. The smell of medicines was either good, bad,  
 or pungent; the taste was bitter or sweet, acrid, oily,  
 salty, or itching (or biting). There were those too which  
 were tasteless. As to weight, medicines were either  
 heavy or light. To purge, medicines which were of a

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8. If the heaven-element increases and the earth-element becomes  
 established, all the other elements are destroyed.

1. By the increasing of the earth-element the fire-element is suppres-  
 sed, *i.e.* remains dormant without action (generally referable to the  
 circulation of the blood).

2. By the increasing of the fire-element the heaven-element is suppressed.

3. When the heaven-element increases the appetite may be destroyed.

4. When foulness of the stomach overflows, the gall or liver may be  
 suppressed.

5. When the liver or gall are inflamed, the wind-element may be  
 suppressed.

6. Increase of the wind-element produces suppression of the fire element.

7. When the fire-element is influenced, the water-element may be  
 suppressed.

8. An excess of the water-element may cause suppression of the earth  
 element.

bitter, acrid, oily and salty taste and were heavy were recommended. To rouse, medicines possessed of a pungent smell were to be used. Remedies also were directed to be given on general principles, as to arrest or accelerate, to harden or soften, to make dry or to moisten, to elevate or depress, to float or sink, to scatter or bring together, etc. Thus to loosen, it was directed to employ that which is sweet and light; to scatter, that which is bitter and acrid; to dry, that which is sweet and moist. The following general divisions were also made:—That which has good smell, rouses, and that which has bad smell, breaks down; that which has good taste, loosens and moistens, and that which has bad taste, pushes and presses strongly; that which has no taste, lets break out. The properties of medicines which are heavy or light are not stated except as above.

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### III. ESTABLISHMENT OF THE UNIVERSITY; 266 GROWTH AND DECAY OF THE CHINESE SCHOOL OF MEDICINE; FROM THE BE- GINNING OF THE VIIIITH CENTURY TO THE MIDDLE OF THE XVITH CENTURY.

In the year A.D. 669 a school of learning was established by the Emperor Tenchi, at the head of which was placed a Korean priest of great learning who had come over to Japan, and becoming naturalized, had, by Imperial mandate, abandoned the priesthood; it was not, however, until the time of the Emperor Mommu, more

than thirty years later, that the University was thoroughly organized, and a little afterward that the Medical Department was established.

In the "Outline History of Education in Japan" it is stated that "the Medical Department had one superintendent, one assistant, one medical professor with forty students, one medical professor of acupuncture with twenty pupils, and one professor of shampooing or massage with ten pupils, one professor of the treatment of diseases of women," and that "thirty physicians for the same were afterwards added. There were also attached to this department a teacher of materia medica, a teacher of the cultivation of medical plants, besides physicians and persons to practice acupuncture and shampooing."

In each province there was one physician with students numbering one-fifth that of the provincial school, the number in which latter varied from fifty, in a great province, down to twenty in a smaller province.

The number of students and professors in the Medical Department of the University considerably exceeded the number of the same in the Department of Medicine, whilst in the Department devoted to Astrology the number was still smaller. The following persons are mentioned in a certain document as holding professorships in medicine in the period of Yoro (about 721): Kitsusen Goshiku, Komei, Taichogen, and Yega Kuni-shige. Among the regulations relating to education and educational institutions, it is stated in the work last quoted, that the professorships of medicine, as well as of astronomy and almanac-making, Chinese and other branches, were only to be filled by men eminently learned in the sciences they were appointed to teach;



also, that the professors of the provincial schools and 268 physicians were to be chosen from among the inhabitants of the provinces in which the schools were established. The pupils of the University were selected from among the children of families not below the eighth rank ; although under certain circumstances and at different times children of families down to the ninth rank were admitted. The pupils of the provincial schools were taken from among the sons of governors of provinces and between the ages of thirteen and sixteen. Upon entering, the grade of each student was determined by his age ; and he was also required to perform the prescribed ceremony of acknowledging the authority of professors and assistant professors as his teachers. The term of service of professors was eight years. The professors of provincial schools and physicians were not allowed to retire from their posts until the expiration of the fixed time of service, unless there was sufficient cause for so doing.

The curriculum embraced a period of nine years, and those students who failed to be taken into the Imperial service within this period were, at its close, or before, dismissed.

One day in every ten was allowed students for recreation ; and in the fifth and ninth months, fifteen days vacation in each were allowed, in order that students might visit their homes, which when very distant, an additional allowance of time for travelling was made.

Before each recreation day the students were examined by professors in reading lessons, and those who shewed themselves more advanced than the others in these examinations, were admitted to the examinations held

at the end of the year. At this annual examination students of the University were examined by the superintendent and assistant superintendent, and those of the provincial schools by the provincial governors. The students were then divided into three classes, according to the ability displayed at the examinations; and those who were found in the lowest class for three successive years were dismissed. Those who passed in all subjects obtained the honorary rank of Ju-hachi-i-ge<sup>1</sup> (a rank 269 of the 26th grade), and a rank one degree lower was bestowed upon those who passed in all but one or two subjects. The rank of students of acupuncture was rated one degree lower than that of medical students.

The services of the professors and assistant professors were estimated according to their exertions in teaching each year; so that those under whose instruction pupils made the more progress were placed in a higher class than those whose pupils were less successful. As to professors of provincial schools their services were also estimated by their efforts in the performance of their duties, but they were divided into three classes according to their respective merits. The services of physicians were estimated in accordance with their success in treatment of patients.

All students were required to study the *Ko-kiyo*,<sup>2</sup> or Book of Filial Piety, and the *Rongo*,<sup>3</sup> or Confucian Analects; and medical students were required at this

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1. At this time there were nine ranks, each of which was divided into two divisions, and each of the last twelve divisions into two grades, making thirty grades in all. It seems that the rank of students of the Medical Department was below that of the students of the University proper.

2. 孝經.

3. 論語. See page 261.

time to read the following works upon medicine and acupuncture: *Ta-so-kiyo*,<sup>4</sup> *Mei-dō-kiyo*,<sup>5</sup> *Miyakukiyo*<sup>6</sup> and *Ko-otsu-kiyo*.<sup>7</sup>

The general course of instruction<sup>8</sup> in the Medical Department included materia medica, anatomy, physiology, and the practice of medicine and surgery. Medicinal plants were studied as to their forms and properties, whilst anatomy, it seems, was taught by means of plates and diagrams. The pulse occupied a most prominent place in the course<sup>270</sup> of study. The first or theoretical portion of the course covered two years, during which time the students read certain medical works, after which they were given practical work in general medical and surgical treatment, and in the treatment of diseases of childhood, as well as in the special branches of the eye and ear, and

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4. 太素經, Written during the Sui Dynasty.

5. 明堂經, A work on acupuncture. The expression *Meido* (Ming t'ang) in this title, according to Wylie, in his notes on Chinese Literature, is the name of an apartment in the palace of the ancient Kotei (Hwáng-té), where he delivered his views on the venous and muscular system; and hence has become a generic designation for acupuncture in all its ramifications.

6. 脈經, A work on the Pulse, partially translated in Cleyer's specimen *Medicinae Sinicae* (2682).

7. 甲乙經, On the Yin and Yang: written by Hwáng-fu-he of the T'ing Dynasty.

8. Mr. Wylie, in referring to the early practice of medicine in China, says: "The practice of medicine has been divided into a number of branches from very remote times, defined with greater or less precision at various epochs. During the Ming, the faculty was definitely fixed by the Government, as consisting of thirteen branches. At the commencement of the present dynasty, eleven branches of practice were recognized by the Imperial Medical College, but the number was afterwards reduced to nine. These are named—Great blood-vessel and small pox complaints, fevers, female complaints, cutaneous complaints, cases of acupuncture, eye complaints, throat, mouth and teeth complaints and bone complaints."

mouth and teeth. The whole course covered seven years, the three last of which were spent in the study of the above mentioned special branches.

There were about forty medical students in all, who together with those studying acupuncture, midwifery and shampooing enjoyed equal advantages with the students of the University.

Separate instruction was also given by professors in acupuncture, Kōtei<sup>9</sup> on acupuncture being the text-book employed, and the length of the course being the same as that pursued by the medical students.

Midwifery was taught in another place, and the students, who were usually chosen from among the maids of the court, and of age between fifteen and twenty-five, were also instructed in the practice of acupuncture and the application of the moxa, as well as in the treatment of wounds and ulcers. The course in shampooing or massage covered only three years.

At this time the practice of medicine, it seems, was not confined to male physicians alone, for in the *Zoku-nihon-gi*, or Supplement to the Chronicles of Japan, it is mentioned, that in the 1st year of the period called Yoro,<sup>10</sup> A.D. 717, the nuns were permitted to assist the sick, administer decoctions, and to treat chronic diseases; they were also permitted to embrace the Buddhist faith and to make use of charms and incantations. Later, in the 6th year of the same period, female professors were, it is stated, first appointed to teach medicine.

The occurrence of a severe epidemic of small-pox in the 7th year of Tenpio, A.D. 735, led to an earnest en-

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9. 黃帝, See 明堂經, note 5, preceding page.

10. 續日本紀.

quiry into the methods of treatment of disease, and undoubtedly added much to the knowledge and experience of the physicians of the day. Small-pox had, it is stated, already been imported by a Japanese fisherman from Shiragi in the year A.D. 670.<sup>11</sup> This epidemic first appeared in Tsukushi, and gradually spread to the city now called Kiyoto, and continued throughout the autumn and winter, accompanied by great mortality, many among the nobility, as well as among the lower classes, falling victims to its virulence. Every effort was put forth to check this dire scourge; offerings were made at many temples by messengers sent by the Emperor; a Buddhist high-priest was called upon to offer prayers in behalf of the Emperor and his people; and a set of regulations of treatment and hygiene was framed and officially notified. Not, however, until the disease had expended its force, nearly two years later, and the lives of several of the court officials of the highest rank had been sacrificed, did it cease.

The notification above referred to is not without interest, as it throws some light upon the state of medical affairs of this period. In substance it reads as follows: Seven articles in relation to the treatment of the body, and the prohibition respecting certain foods to be avoided on the day of the patient's going to bed. This pestilence is commonly called *Sek-han-so* 赤斑瘡, or red pox. At

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11. Small-pox, it would seem, engaged the attention of Chinese physicians as far back as the commencement of the Christian Era, while inoculation has been practiced for many centuries. The first Chinese work devoted to the subject, mentioned by Wylie, is the 聞人氏痘疹論, or discourses of Wan-jin-kwei on small-pox, published in 1323, nearly four centuries after the first accurate description of the disease by Rhazes, the Arabian physician.

first it resembles intermittent fever. Before the eruption appears the patient has had to suffer for some three to six days in bed. The time during which the eruption is coming out is generally three or four days. There is great heat like burning in all the members and internal organs of the body. By this time the patient experiences great thirst and wants to drink cold water, but in this he should be restrained. When the eruption or sores begin to subside the spirit gradually becomes quiet. On the other hand, dysentery may set in, and should this not be relieved hæmorrhages may complicate the case. Hæmorrhage may also occur before or after the attack of dysentery, and there is no fixed locality of occurrence. When dysentery with bleeding occurs, there is either coughing, violent vomiting, hæmoptysis, or bleeding from the nose.

- 272 In either case the most urgent symptom requires immediate attention, and recognizing its meaning, the treatment should be accordingly. A warm compress should be kept lightly bound upon the navel, and should be of soft material and not allowed to become cold. The patient should not lie upon the ground, and only upon the floor when a mat is spread out over it. After the temperature has subsided and the patient desires something to eat, rice water, soft boiled rice and millet may be given. Raw fish, and vegetables should be forbidden, as well as cold water and ice. When the time approaches during which an attack of dysentery is most likely to occur, well boiled onions should be partaken of abundantly; and should hæmorrhages occur, a gruel made from the flour of glutinous rice, well boiled, should be taken several times warm, also a warm gruel made of dried food, glutinous rice, and common rice. If the symptoms do

not ameliorate, repeat the above five or six times. The dried food should not be pounded in the mortar too fine. Those who are taken with this disease do not care much for food; when eaten, therefore, thorough mastication is desirable. From the beginning of the sickness parts of sea-pine (*Pinus koraiensis*) and pounded salt, roasted, should be frequently placed in the mouth, even though the tongue be burned by so doing. Even after twenty days following recovery, raw fish or vegetables should not be eaten; while it is harmful to drink water or bathe, to have sexual intercourse, or to take violent exercise, or to expose oneself to the wind or rain. Should the patient fail to observe these rules, *kuzukuran* (cholera sporadica) is sure to follow, and diuria also. The *rōhatsu* (lymphadenitis inguinalis) when far advanced is incurable. If after twenty days it is desired to eat fish, it should be well boiled, or cooked, before being taken. The meat of the dried awabi or sea-ear and bonito may be eaten without boiling if so desired; certain other fish, however, as the mackerel, must not be eaten under any circumstances. Pills and powders are powerless against this pestilence. If fever be present in the chest, a decoction of ginseng may be administered.

In the 6th year of Tempio Shōhō, A.D. 754, two students returned from China who had been sent to that country in a former year for the purpose of study. They were accompanied by a Chinese, a Buddhist priest named Shiyaku no Kanshin, who was possessed of no little skill in the art of determining the properties and values of "medical stones." This priest was soon placed in charge of students, whom he instructed in his art and also in medicine.

Surgical art, which until this time can hardly be said to have existed as a separate branch of medicine, was much advanced through the teachings of Ōmura no ataye Fukukitsu, a Tamba man, and a descendant of Take no uchi, who enjoyed a wide renown for his skill in curing sores of all kinds, and who wrote a treatise upon this subject; which work, it is said, was the first written by any Japanese upon the treatment of external diseases.

In the year A.D. 758, the Empress Kōken, having heard that many of the medical professors and physicians were inefficient men, commanded that the following works should be read by all students of medicine; the *Tai-so*, *Kō-otsu-k'yo*, *Myaku-kiyo*,<sup>12</sup> and *Hon-so*,<sup>13</sup> and the *Sō-mon*, *Shen-k'yo*,<sup>14</sup> and *Mei-do-miyaku-ketsu*,<sup>15</sup> by students of acupuncture.

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12. See page 269, notes 4, 6, 7.

13. 本草, Wylie gives the following description of the 本草綱目 (Pun ts'au kang m'uh), the great Chinese Materia Medica, in 52 fasciculi, by 李時珍 (Iê Shi-chin) of the Ming period. "The compiler spent 30 years on the work, having made extracts from upwards of eight hundred preceding authors, from whom he selected 1518 different medicaments, added 374 new ones, making in all 1892. These are arranged in 62 classes, under 16 divisions,—Water, Fire, Earth, Minerals, Herbs, Grain, Vegetables, Fruit, Trees, Garments and Utensils, Insects, Fishes, Crustacea, Birds, Beasts, and Man. Under each substance, the Correct Name is first given, which is followed by an Explanation of the Name; after this there are Explanatory Remarks, Solution of Doubts, and Correction of Errors; to which is added the Savor, Taste, the Applications, with the prescriptions in which it is used. There are three books of pictorial illustrations at the commencement, with two books of prefatory directions, and two books forming an index to the various medicines, classed according to the complaints for which they are used. The nucleus of this and other writings upon this subject is said to be a small work which ancient tradition ascribes to Shun-nung 神農."

14. 鍼經 A work on Acupuncture.

15. 明堂脈訣, A treatise on the Pulse and Acupuncture.



In the *Yen-gi-shiki*, or Ceremonials of the Yengi period (A. D. 901-922), the terms during which lectures on certain medical books were required to be given were, <sup>274</sup>—on the *Dai-sai-kiyo*, 460 days; on the *Shin-shiu hon-zo-kiyo*<sup>16</sup> and *Sho-hin*,<sup>17</sup> 310 days; on the *Mei-do*,<sup>18</sup> 200 days, and on the *Hachi-ju-ichi Nan-kiyo*,<sup>19</sup> 60 days.

At about this time a grant of land was made for the support of the University, and the Departments of Music, Astrology, and Medicine, the University receiving about 75 acres, and these Departments about 25 acres each. Since which time other endowments have been made from time to time of money, rice, and lands. Allowances were also made to worthy students to enable them to engage exclusively in study. The practice of granting such allowances is said to have originated during the reign of the Emperor Kwanmu, A. D. 782, but in reality may have had even an earlier origin.

In connection with this system of rewards, should be mentioned the curious custom then practised among professors of provincial schools and physicians, of sending their *alma-mater*, as a token of gratitude, the income of the first year after appointment to office. Indeed, such importance was attached to the faithful observance of this custom, that it was at this time, and again some eighty years later, made the subject of Imperial decree; on which latter occasion the amount to be presented was

16. 新修本草經 New Revised *Hon-zo*. See note 13, p. 273.

17. 小品 or 小品方 A treatise containing miscellaneous prescriptions.

18. 明堂 See page 269.

19. 八十一難經 In addition to note 14, page 261, it may be mentioned that the doubtful questions which this work professed to solve, arose through the obscurity of the *So-mon*, *Kei-su* (page 261) and other works of early date. It was written, it is stated, in the third century B. C.

fixed by law to be in proportion to the size and importance of the province from which it was sent, the rate for each person varying in equivalent from fifty to two hundred bundles of rice in the straw, which was to be forwarded in articles of small bulk and of such a nature as would command for them a ready sale at the university town. The rate was, however, finally fixed at one-tenth part of the income of the first year.

The principles of the treatment of disease, as taught by the Chinese school of T'ang, had gradually and so thoroughly permeated the teachings of the learned professors of the land, that it was feared the pure Japanese art, as taught in ancient times by the gods to men, would, ere long, cease to be known or practised; besides this, in the early part  
275 of the reign of the Emperor Heijo (A.D. 806-810), a plague had visited the country, which like that of an earlier day, had carried off many of the youth of the land, and the return of which plague was continually dreaded. The Emperor thinking, therefore, that perhaps the return to the methods of early days might result in good to his people and avert the threatened evil, ordered Abe no Masanawa and Idzumo no Hirotsada to prepare a work on pure Japanese medicine, which they set about, and completed soon after in the third year of this reign, being called the period of Daidō (A.D. 806-809). This work, the *Dai-do-rui-shū-hō*,<sup>20</sup> or Collection of Methods of the period Daidō, comprising one hundred volumes, contained the formulæ and modes of employment of various medical compounds which had been in use since the days of Ōna-muchi and Sukuna-hiko-na,<sup>21</sup> and which had been handed down from them, together with a few of the best

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20. 大同類聚方, see page 251

21. See page 248.

prescriptions obtained from foreign lands. These formulæ, and the modes of their employment, were collected from ancient records in country villages and Shinto shrines, and from noted houses of country physicians who still practised according to the old methods, and who had kept the knowledge of these prescriptions secret.

Besides medical formulæ, this work contained certain laws or regulations relating to physicians, a mention of some of which may not prove out of place here.

Every medical officer was expected, each morning at four o'clock, to feel of his own pulse "that he might discern the spirit of the day"; after which he was required to present himself at court.

During the period of attendance upon the Emperor, no medical officer was permitted to lie with his wife, and an infraction of this rule would render the offender liable to lose his office. He was not permitted to prescribe directly for any of the female attendants of the court. Whenever the Emperor became ill, one physician was selected to treat the case, and any disagreement as to opinion among the court physicians, it was required should be notified at once. The *Da-dō-rui-shu-lō* was the standard for prescribing; and foreign prescriptions might only be employed in extreme cases, and then only after careful comparison with the methods of this work.

The medical officer of the court was not allowed to 276  
drink wine during his attendance upon the Emperor: he was required at all times to avoid intercourse with Buddhist priests, and should he even meet a priest or nun on the street, he would not be allowed to attend court upon the same day. He was also required to study the philosophy of the *In Yin* and *Iō Yang*, or Passive and Active

Essences, to which the Chinese trace the origin of all things. The punishments for infractions of these and other laws relating to medical officers were principally dismissal, fines, or imprisonment. For instance, for not following the original prescription as laid down in the *Dai-dō-rui-shu-hō*, that is, as to quantities of the several ingredients, or for making a mistake in writing upon the envelope the text of the prescription and rules for taking it, three years imprisonment and a fine of 80 pounds of copper coins. Should there be any impurity in the medicines offered, or any mistakes occur in the preparation, 60 lashes were inflicted, and a fine of 8 pounds of copper coins required to be paid. Carelessness in the observance of the rules laid down for the preparation of food for the Imperial table, or intentional departure therefrom, was likewise punished severely.

It is said that copies of the *Dai-dō-rui-shu-hō* published in later years, and which are to be seen even at the present day, differ considerably from the original work in numerous omissions and alterations, and in having incorporated much that is of Chinese origin.

A few years after the *Dai-dō-rui-shu-hō* had been completed, Minetsugu, the son of Hirosada, who in the meanwhile had succeeded his father at the court, and had been appointed head of the Imperial Medical College, was ordered, with the assistance of several other physicians, to formulate an eclectic method of treatment of disease by compilation from native and foreign treatises. The *Kin-ran-hō*,<sup>22</sup> or Golden Orchid Prescriptions, consisting of fifty volumes published soon after, was the result of the labors of Minetsugu and his colleagues.

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22. 金蘭方. The *Kin-ran* is the *Cephalanthera falcata*, *Lindl.*

The forced reform in medical practice attempted by the Emperor Heijo was, however, short lived, for his successor the Emperor Saga so successfully encouraged the introduction of Chinese literature and ceremonial observances, that Chinese medicine has ever since flourished, while the so-called pure Japanese art has become less and less known.

It is mentioned in history that during the reign of 277 the Emperor Saga, and about the year A.D. 820, five persons skilled in the practice of acupuncture were at that time attached to the Imperial Palace. They received a monthly allowance and were required to read the following works: the *Shin-shin-hon-so-k'yo*,<sup>23</sup> compiled under the T'ang Dynasty,<sup>24</sup> the *Mei-do-kiyo*,<sup>25</sup> and the *Rin-shi-kishi-hō*,<sup>26</sup> also certain works upon medicine; the *Sen-kin-hō*,<sup>27</sup> the *Sho-hin-kiyo*,<sup>28</sup> the *Shu-ken-hō*,<sup>29</sup> and the *Ko-sai-hō*.<sup>30</sup>

In the year A.D. 838, being the 5th of Showa, a physician named Sugawara no Kajinari was sent to China for the purpose of study. After his return a few years later he acquired a great reputation in acupuncture, and was soon appointed to be attendant physician upon the Emperor. Later, Monobe no Ason Kōsen, of Iyo, a

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23. 新修本草經, A New Revised Botany. See page 273.

24. By 李世勣.

25. Now known as *Mei-do-miyaku-ketsu*. See page 283.

26. 劉涓子遺方, A treatise on Surgery.

27. 千金方, A collection of most valued prescriptions.

28. 小品經, See page 261.

29. 集驗方, A collection of prescriptions.

30. 廣濟方, These three last mentioned works are now only known through quotations from them in the *I-shin-hō* 醫心方 and *I-riyaku-shiyo* 醫略抄, compiled by Tanba Yasuyori and Tsunetada.

man of extensive reading and great learning, was made head of the Imperial Medical College; he was the first to draw attention to the importance of the study of hygiene, and from the great interest he displayed in this subject, upon which he wrote a book of some 30 volumes, he has been called the "Father of Hygiene."

In the period called Tencho (A.D. 824-834) a charity hospital was established by Fujiwara Fuyutsugu for the medical care of the sick. This, however, is not the first mention in history of the establishment of a place for the treatment of the sick, for, as already stated, bureaux for the distribution of medicines and food to the poor were established in the reign of Empress Suiko; and later, in the reign of Shomu Tenno, A.D. 730, the first dispensary was established.

In the year A.D. 984, in the reign of the Emperor Yenyu, Tamba Yasuyori, a professor of acupuncture, 278 completed the *I-shin-hō*,<sup>31</sup> a work comprised in some 30 volumes, and compiled from over 100 different Chinese medical works of the time of the Sui and T'ang Dynasties, A.D. 589-907, and containing numerous discussions on the causes of disease, together with methods of treatment. It also contained, as an appendix, the works known as *Hon-so*,<sup>32</sup> *Ya-ku-sei*,<sup>33</sup> and *Mei-dō-ko-ke-tsu*,<sup>34</sup> together with notes on foods and hygiene.

At this time a medical work compiled from the *Sō-gen-hō*<sup>35</sup> of the time of the Sui Dynasty, China, (A.D. 589-616) was much read throughout the whole of Japan,

31. 醫心方.

32. 本草, See page 273.

33. 藥性, On the medicinal qualities of remedies.

34. 明堂孔穴, On acupuncture.

35. 巢元方, (Chou-yuên fung) compiled by So (Chou) and Gen (Yuên).

This work, known as the *Biyo-gen-koron*,<sup>36</sup> consisted of 67 volumes or divisions, and contained 1720 discussions upon the causes of disease. Previous to this, and in the period called Yengi A.D. 901-923, the following works were published by Fukane Sukehito: *Yō-jō-sho*,<sup>37</sup> a work on hygiene in seven volumes; *Sho-chiu-hō*,<sup>38</sup> mentioned in the *Rei-ran-shu*,<sup>39</sup> as containing many curious things touching the action of medicines, and the *Hon-zo-wa-myo*,<sup>40</sup> or the *Hon-zo* with Japanese names.

Until the time of the Emperor Go-Shirakawa, A.D. 1156, the country had not been so troubled with internal strife as to materially interfere with the peaceful pursuits of art and literature; however, from the beginning of this reign until the accession to power of the first of the Tokugawa Shoguns, the country was, from time to time, the scene of bloody wars; and although there were periods of tranquility, the progress of medicine, and especially that of the Chinese school, was greatly retarded. Indeed, the latter half of this period of medical history may rightly be described as one of decay. Glancing over the political history of this period, certain events stand out with prominence as playing a special part in its medical history. These are: the wars of Hogen (A.D. 1156), and Heiji (A.D. 1159), and afterwards, of Yoshimaka in the north, and Yoritomo in the east; the successive accession to power of the Taira, and 279 Hōjō families, the war of Genkō, the establishment of the Ashikaga line of Shoguns and the war of Ōnin

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36. 病源候論, Kochi Zensetsu states that this work contains no mention respecting remedies to be employed.

37. 養生鈔,

38. 掌中方

39. 靈蘭集. See page

40. 本草和名

(A.D. 1467-8), during which the city of Kiyoto, then the principal seat of learning, was almost destroyed. In this latter event, medical science received a most severe blow; to which blow the increased influence of Buddhism seems to have lent considerable force. With the accession to power of Hideyoshi, however, came a partial respite; but the influence of war did not even then die out, nor did medical art make much progress, save in the increase in knowledge of foreign medicines brought to Japan through Hideyoshi's invasion of Korea.

These wars, disastrous indeed, were not, however without some benefit to the surgeons of these and subsequent times, for they increased their experience in the treatment of wounds and injuries received in battle; while the ranks of the profession were reinforced by not a few men, famous at arms, who became interested in the art of surgery and medicine and eventually took up its practice. Among such was Nikki Ukiyo, a follower of the Shogun Yoshiaki, (A.D. 1568-73), who having left his master, settled in Harima, shaved his head, changed his name to Nikki Riyojin, and soon became very famous on account of his great skill in curing diseases. Hosokawa Katsumoto,<sup>41</sup> although not a physician, left behind him, as a monument of his labor and patience, the book called *Rei-ran-shu*,<sup>42</sup> a collection of extracts from numerous medical works of that and preceding times, and written in mixed Chinese and Japanese character, (Kana-majiri).

Among the most prominent families which furnished the country with able physicians during this period of

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41. He became *Kuwari rei* under the Ashikaga Shogunate in 1446, and attained great power.

42. 靈蘭集.



medical history, and especially before the time when the sovereigns of Japan reigned at Nara (A.D. 710–784), we find the names of many descended from foreigners, who had come to Japan and become naturalized citizens of the country. The son of Chisō<sup>43</sup> became Yamato no kusushi no ōmi,<sup>44</sup> the son of Oku toku, the Korean, became Mitoribe no kusushi no ōmi;<sup>45</sup> the descendants of Keijitsu,<sup>46</sup> became Naniwa no Kusushi,<sup>47</sup> and the descen- 280  
dants of Tsukuru (Do chu-en), a Chinese, became Hachide no Kusushi.<sup>48</sup> Riu no Taniwa or Tamba, was descended from Rei-tei (Lin-te) A.D. 168–190 of the Han Dynasty in China. Hada no Koremune was a descendant of the first Emperor of the Sui Dynasty, A.D. 589–618. The famous families, however, were not all of foreign descent; and one of these, that of Wake (和氣), deserves special mention, for from it sprang men whose great learning and skill gained for them during the middle ages a lasting reputation, and who, with the descendants of Riu no Tamba mentioned above, were leaders of their profession during many centuries. The family of Wake was descended from the Emperor Suinin (B.C. 29). Hiroyo, the first of the family, who attained great celebrity in medicine, was the eldest son of Kiyomaro<sup>49</sup> the patriot. He took up literature as a pursuit, and, after having suffered imprisonment for being implicated in some offence against the government, in the year A. D. 785, he was restored

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43. See page 262.

44. Chief physician of Yamato

45. Chief physician of Mitoribe.

46. See page 263.

47. Chief physicians of Naniwa in Central Japan.

48. Chief physicians of Hachida.

49. A Minister of the Empress Jōken, exiled in A.D. 769.

to favor and later received the appointment of Director of the University. Here he was instrumental in obtaining an appropriation of land for the encouragement of education. He established a course of lectures upon the *Mei-kiyo*,<sup>50</sup> and also delivered discourses upon the *Yu* (Yin) and *Yō* (Yang) of Chinese philosophy. Among his productions were new compilations of the works known as *Yaku-kiyo*,<sup>51</sup> and the *Tai-so-kiyo*.<sup>52</sup> Shigure, a great-grandson of Wake no Kiyomaro,<sup>53</sup> also attained to considerable eminence in his profession. He received the title of I-hakase, or professor of medicine, and Shin-hakase, or professor of acupuncture, and in the year A.D. 957 became head of the Imperial Medical Department. Among the most noted of those who lived after the time of

281 Shigure was Narisada, a descendant of the 5th generation, who was called the Yamato or Japanese Henjaku.<sup>54</sup> Several generations after Narisada, there lived one named Tsunenari, who became chief of the Imperial Medical Department, and who possessed more than ten thousand volumes<sup>55</sup> of medical works. Unfortunately this

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50. Mei-do-kiyo? See page 269.

51. 藥經

52. 太素經 See page 260.

53. See note 49.

54. 扁鵲 Pien Ch'io, an ancient Chinese physician spoken of in the Historical Record. "It is said of him, that on one occasion he received from a genius medicine and a medical book, and was instructed to drink the dew from bamboo trees for thirty days, at the end of which time his knowledge became perfect."—William Scarborough in "Chinese Proverbs." Henjaku was the author of the famous *Van-kiyo*. See note 14, p. 261.

55. It should be borne in mind, that Japanese books, until recently, were printed (and often in large type) on only one side of the sheet, the blank side being folded inward; and that they were divided into small volumes, or fasciculi, of from 50 to 100 pages each; so that even such large works as the *Hon-so*, usually divided into 50 or 60 volumes, if printed in ordinary type and on foreign paper, would probably be contained in an Svo volume of 500 pages or less.

family library was destroyed by fire during the war in the period Ōan, in the year A. D. 1370, it having been removed to the Imperial Palace for safety.

Akishige, several generations later, became the head of the Medical Department, and was also appointed chief of dispensaries. He was adopted while a youth by Tamba no Shigenaga, from which time the Wake and Tamba families were united. Akishige changed his name to that of Sōkan, and shaved his head; and the custom thus established of shaving the head has ever since been observed by this family. After Sōkan, the names of Aki-chika and Akihide, the grandson and great grandson of Sōkan, deserve mention. The former of these physicians, Akichika, went to China in the period Yeisho, A D. 1504–1510, and it is said, having cured the Emperor of a grievous disorder, he gained great reputation in that country. After the time of Akihide the family name was changed to Nakai.

The family of Tamba, frequently mentioned in these notes, claims that it is descended, as it has been already stated, from the Emperor Rei-tei (Ling-té)<sup>56</sup> of the Han Dynasty. The family estate was in Yatagōri in the province of Tamba, from which the family took its name. Yasuyori<sup>57</sup> was the first to receive the title of Sukune, became professor of acupuncture, and compiled the *I-shin-hō*,<sup>58</sup> and afterwards wrote the *Shin-i hō*.<sup>59</sup> Later, and during the time of Masatada, a descendant of Yasuyori, about A D. 1080, the Queen of the Korean King was taken ill, and the skill of the native physicians not availing, a messenger with numerous presents was despatched to

56. 靈帝.

58. See page 277.

57. See page 277.

59. See page 277.

Japan, with the request that a physician be sent to Korea. The request, however, was refused by the Central Government on the ground that it was not couched in respectful terms. It is stated by some, that Masatada, who had become famous, was the physician whom it was desired should be sent; but Mr. Kaku in the *kō-koku-i-jī-yen-kaku-shō-shi*,<sup>60</sup> seems to be of a different opinion. After Masatada, Shigeyasu and Tadayasu were prominent members of this family. The great celebrity of these two families of Wake and Tamba, was based principally upon their skill in treatment of sores and wounds by cauterization.

Among other families which produced great physicians, is to be mentioned that of Kushimoto, Shinto priests of Watarai, in Ise, who for many generations exercised the double function of priest and physician.

Other notable physicians of these times were Taketa Shōkei, Kancyasu, a descendant of Tamba Yasuyori, Jochin, Kajiwara Shōzen and Yoshida Sōkei. Of Taketa Shōkei, it is said that he went to China in the year A.D. 1369, and returned nine years later, having thoroughly acquainted himself with the methods of the Chinese physicians. Kajiwara Shōzen, who served under the Shōgun Yoshimitsu (A.D. 1368-1408), wrote the books called *Ban-an-hō*,<sup>61</sup> or Medical Rules of all Safety, and the *Ton-i hō*<sup>62</sup> on the methods which effect immediate cure.

60 皇國醫事沿革小史, Short History of Japanese Medical Progress.

61. 萬安方, 62. 頓醫方. In the *Ban-an-hō* and *Ton-i-hō*, numerous quotations, are made, Mr. Kochi Zensetsu states, from a work called the *W'a-sai-kiyoku-hō* 和劑局方. This work, much read at the time in both China and Japan, was compiled by Imperial command by one *Chin-shi-bun* 陳師文 (Ch'in sze wán) during the time of the Sung Dynasty and in the period Yuén pa'ou (A.D. 1078-1085).

Yoshida Sōkei visited China in the year 1539, and like Tamba Akichika was called upon to attend the Emperor, the successful result of which made his name famous.

Through his minute acquaintance with botany, he<sup>283</sup> gained the name of Nik kuwa shi or the Japanese Chin jitsu kuwa.<sup>63</sup> His son Sōjun is said to have produced the book entitled *San-rui-hon-sō*,<sup>64</sup> a compiled botany, and his grandson Sōtatsu, a physician to the Shogun Iyeyasu, the *Hon-sō-wa-miyo*,<sup>65</sup> a botany with Japanese names.

During the period under consideration the various theories held by the Japanese, in regard to the cause of disease and its treatment, may be briefly summed up in a few lines. In the early portion of this period, disease was attributed to two causes; namely, evil spirits, and food and drink; those diseases which were cured by prayers and incantations were considered as belonging to the first class, and all others to the second. Later, all disease was attributed to wind and cold, so that even in asthenic fevers stimulating medicines were exclusively employed.

At a still later day, the belief in the theory that heat and moisture were the true causes of disease became quite general.

In practice, it seems that small-pox and intermittent fever<sup>66</sup> were classed under the first of the above mentioned heads, for it was held that there dwelt a spirit in the one and a demon in the other; indeed, intermittent fever,

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63. 陳日華, (Ch'in jih hwa) a Chinese who compiled a work on botany during the first region of the Sung Dynasty (A.D. 960-1127).

64. 纂類本草.

65. 本草倭名.

66. The English equivalents of the Chinese names of diseases have been found in the *Kan-yo-byō-mei-tai-shō-roku*, a Dictionary of Chinese, English and Japanese names of diseases.

we are told, was known as *warawa yamai*, or the demoniacal disease, while nervous diseases were called *mononoke*, and were supposed to be caused by the evil spirits of the dead and by demons. In the treatment of these diseases, therefore, exorcism was an important factor, while medication held but a secondary place. Indeed such was the importance attached to this mode of treatment at one time, that a professor of exorcism was appointed to the Imperial Medical College.

For disorders of the second class, and especially for sores and bruises, as well as internal diseases, cauterization by the moxa was largely employed. In fevers, cold water was sometimes used, the modes of applying it being three, namely, immersion in a bath, by a kind of fine shower bath, and by pouring cold water over the patient. Cold baths were also used for sores, boils, and eruptive skin diseases in general.

- 284 That the condition of the pulse still held a very important position as a means of diagnosis among the physicians of the latter portion of this period, may be judged from the following incident taken from the *Tai-kei-ki*<sup>67</sup> or Annals of Japan, wherein it is related, that, on a certain occasion, the wife of Ashikaga Saniyoye-no-kami, Tadayoshi, having been taken severely ill, a number of skillful physicians from the famous schools of Wake and Tamba were summoned to attend, and each was required separately to diagnose the case and suggest a mode of treatment.

The first, after carefully feeling the pulse of the patient, attributed the disorder to cold, and recommended certain medicines suited to meet this condition, believed by him

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67. 太平記.

to be present. Another, who believed all diseases to be due to a morbid condition of the mind, diagnosed this case to be due to such a cause, and prescribed accordingly; a third, located the disease in the abdomen, and recommended certain herbs as useful in curing the disorder.

These various opinions, however, resulting in no benefit to the patient, a physician from the Imperial Dispensary was summoned, who declared after long deliberation, that the pulse he felt was that of pregnancy, and furthermore, that the child born would be a boy; and so it proved to be!

The following remarks, taken from the *Shakuso-o-rai*, as quoted by Mr. Kaku Kaishiro, throw some light upon the condition of medical knowledge at the close of the period under consideration.

"It seems that two schools of physicians, Wake and Tamba, are making new experiments in their art, notwithstanding the antiquity of their families; and now it comes to pass that medicines which they employ are nearly all new and imported: such as:

Ninjin	人參	Panax Ginseng.
Riūnō	龍腦	Camphor.
Ketsunan	竭南	(血) Dracaena draco,
Mokukō	木香	Inula Helenium, <i>L.</i> (?)
Shukusa	縮砂	Amonum minor,
Riyokiyo	良姜	Alpina Galangas, <i>Sw.</i> ,
Keishin	桂心	Heart of the Cinnamomum Loureirii, <i>Nes.</i>
Kanzō	甘草	Glycyrrhiza echinata, or <i>G. glabra</i> , 285
Senkiū	川芎	Conioselinum univittatum, <i>Turcz.</i> ,
Tōki	當歸	Ligusticum acutilobum, <i>Sieb. et Zucc.</i> ,

Hazu	巴豆	Croton Tiglium, <i>L.</i> ,
Daiwo	大黃	Rheum undulatum, <i>L.</i> ,
Kotan	虎膽	Tiger's gall (?)
Shinsha	辰砂	Cinnabar (from Shin-cheu fu, <i>Williams</i> ),
Ōwō	雄黃	Realgar,
Nerimitsu	煉蜜	Clarified honey.
Sanyaku	山藥	Dioscorea japonica, <i>Thunb.</i> ,
Giushitsu	牛膝	Achyranthes bidentata, <i>Bl.</i> , <i>var.</i> japonica <i>Aliq.</i> ,
Kengoshi	牽牛子	Pharpetis trilobu, <i>Aliq</i> (Seed),
Kōbushi	香附子	Cyperus rotundus, <i>L.</i> ,
Shiso	紫蘇	Perilla arguta, <i>Benth.</i> ,
Keigai	荊芥	Chenopodium ambrosioides, <i>L.</i> ,
Kankatsu	乾葛	Pueraria Thnbergiana, <i>Benth.</i> ,(?),
Kōboku	厚朴	Magnolia hypoleuca, <i>Smith</i> ,
Kippi	橘皮	Citrus aurantium, <i>Smith</i> ,
Kushin	苦辛	Sophora angustifolia (?),
Biyakujutsu	白朮	Atractylodes alba, <i>Smith</i> ,
Jiwō	地黃	Rehmannia lutea, <i>Maxim.</i> ,
Rokujo	鹿茸	Hartshorn,
Sekkuwai	石灰	Lime,
Kankatsu	甘葛	Sweet <i>Katsu</i> (a kind of dolichos— <i>Williams</i> ),
Giuwō	牛黃	Cow bezoar,
Hakukuwada	白花蛇	The skin of the white spotted snake."

"You possess these medicines, and so I do not send them to you. As to the pharmaceutical apparatus, such as dishes, mortars, cutters, sand-bath, sieve, etc., you have them I have no doubt. As I have heard, the men of the present age all carry with them such medicines as these, and to be without which one must be ashamed.



- Sogōkō 蘇合香 Rose-maloes, a kind of liquid strax obtained from the liquidam tree, and the *Altingia excelsa*, *Williams*,  
 Riū nō yen 龍腦圓 Camphor pellets,  
 Chinja yen 沈麝圓 *Chinja* pellets, a medicine used in 286 all painful nervous diseases.<sup>48</sup>  
 Toshishi yen 兔絲子圓 *Cuscuta japonica* pellets,<sup>49</sup>  
 Akada yaku 阿加陀藥  
 Rōcha 蠟茶 Roasted tea.

“As to the emetic Kan-ō yen 感應圓, it is an excellent medicine for cholera sporadica, while Kikokusan 鬼哭 散<sup>50</sup> is the best in intermittent fever. In treating boils, 288 Goko 五香<sup>51</sup> and Rengiyotō 連堯湯<sup>52</sup> are most efficacious.

68. The writer is indebted to Drs. Kushibe and Shingu of Tokiyo, and to the Central Sanitary Bureau, for the substance of the following explanations, relative to the medicines mentioned above and hereafter. The English and Latin names of diseases given here and elsewhere, are, as already noted (p. 283), only approximate equivalents, and are, for the most part, found in the *Kan-yo-bi-yo-mei-kasho-roku*.

As to the ingredients of Chinja yen, neither of the several sources of reference within the writer's reach state at all clearly. There is, however, a medicine called *Shin-sen-chinja-gwan*, or the heavenly-mountain-sprite *chinja*-pellets, which contains the following ingredients:—  
 Motsu yaku 沒藥 Myrrh.

Ketsuketsu 血竭 Dragon's blood, a sort of dry red resin used as a pigment, and obtained from the fruit of the *Dæmonorops* [*Calamus*] *draco*, a kind of palm found in Sumatra; *Williams*,

Jakō 麝香 Musk,

Shinsha 辰砂 Cinnabar from Shin-cheu fu in Hunan, *Williams*.

Mōkukō 木香 *Inula Helinum*, *L.*,

Kanzā 甘草 Liquorice, *Smith*.

These should be reduced to powder. The liquorice should be boiled until it becomes glossy, then mixed well and made into small pellets, one of which is a dose and should be masticated well and swallowed with a draught of a decoction called *Ai-yo-yen-to* (姜鹽湯) ginger and salt decoction.

69. This remedy is composed of the following substances :

Toshishi	兔絲子,	Cuscuta japonica, <i>Chois</i> ,
Rokujō	鹿茸,	
Nikkei	肉桂	Cinnamon,
Sekirūhiyō	石龍芮	Ranunculus saleratus <i>L.</i> ,
Bushi	附子	Aconitum Fischeri, <i>Reichenb.</i> ,
Takusha	澤瀉	Alisma plantago: eight ounces each.
Hageki	巴戟,	
Bōfū	防風	Siler divaricatum, <i>Benth</i> , et <i>Hook.</i> ,
Nikushuyō	肉蓯蓉	The fleshy roots of one of the varieties of a plant allied to the <i>Cynomorium</i> , a fungoid plant much esteemed, sometimes used in the preparation of soups, and also as a remedy in colic, <i>Williams</i> ,
Tōchiū	杜仲	Euonymus japonicus, <i>Thunb.</i> ,
Ukiyo	茴香	Foeniculum vulgare, <i>Gaertn.</i> ,
Jinkō	沈香	Aquilaria Agallocha, <i>Reichb.</i> ,
Bukuriyō	茯苓	Pachyma cocos, <i>Smith</i> ,
Sekikoku	石薺	Dendrobolium moniliforme, <i>Sacc.</i>
Zokudan	續斷	Lamium album, <i>L.</i> , var. <i>barbatum</i> ,
Sanshuyū	山茱萸	A sort of dog-wood ( <i>Cornus officinalis</i> ) used as a vermifuge and in fevers, <i>Williams</i> .
Hō kotsushi	補骨脂	Perhaps the same as Kōtsu hōshi 骨補脂. <i>Psoralea corylifolia</i> .
Jukūjwō	熟地黃	Rehmannia lutea (mallow root),
Hitsuchoka	華澄茄	Cubebs, including, probably, the seeds of the <i>Cubeba</i> and <i>Daphnidium</i> , ( <i>Williams</i> ) about one scruple each,
Sōhiyōshō	桑螵蛸	A chrysalis having a woolly envelope like that of the mantis, <i>Williams</i> ,
Gomishi	五味子	Red berries of the <i>Kadsura Chinensis</i> or <i>Japonica</i> , called in Japan the <i>Sane</i> or <i>binan-kadzura</i> ,
Fukubonshi	覆盆子	Rubus Tokkura, <i>Sieb.</i> ,
Kiūkiū	藟苈	Conioselinum univittatum, <i>Turez.</i> , 4 oz. each;

These substances are to be reduced to a powder, moistened with *Sake* (a kind of rice-wine containing about 16 per cent of alcohol), and made into a paste with wheaten flour. The paste is then made into pellets of the seed of the *Elaeococca verrucosa*. These pellets are to be taken either with warm *Sake* or a hot solution of salt.

This compound is used in the following disorders: diseases of the kidneys; in the five kinds of consumption (of the lungs); the seven kinds of fever; in spasm of the smaller intestines; irritating pain in the four

extremities; when the face is jaundiced; when there is dryness of the tongue or lips; amblyopia, tinnitus aurium; when suffering from mental prostration; in sudden joy, or anger; when one is melancholy, and takes delight in nothing; when food seems tasteless, and water does not refresh; when there is dropsy of the heart and abdomen. paralysis or weakness of the legs and knees, turbidity and frequency of the urine; impotency, eczema of the thighs, dysuria, stricture, bloody urine or incontinence

70. Kikokusan contains:

Ninjin	人參	Panax ginseng, 4 oz.,	Jōsan 常山	Orixa japonica.
Bukuriyo	茯苓	Pachyma cocos,	Nikkei 肉桂	Cinnamon,
Kanzō	甘草	Liquorice; each 8 oz.		

These are reduced to powder and 4 *sen*, ( $2\frac{1}{2}$  grains?) which, together with 8 *fun* 1 *sen* (about 52 grains?) of a kind of *sake* called *muku-waishu*, constitutes a dose. It is used for colds, for intermittent and other fevers, and should be taken cold, and especially whenever there is a sense of sinking at the heart.

71. Probably Gōkōsan 五香散; which contains the following five substances:

Jinkō	沈香	Aquilaria Agallocha, <i>Roxb.</i> ,
Chōkō	丁香	Eugenia caryophyllata, <i>Thunb.</i> ,
Mokukō	木香	Inula Helinum, <i>L.</i> ,
Nūkō	乳香	Olibanum, <i>Heburn</i> ,
Kuwakkō	藿香	Betony or bishopwort, ( <i>Lophanthus rugosus</i> ), also applied to <i>Leonica officinalis</i> , <i>Williams</i> .

Equal weights of these substances are boiled in a cotton or raw-silk bag. It is stated, that it is better to employ musk instead of the bishopwort.

Gōkōsan has been mostly used, it is said, by the physicians of more recent times for diseases of children. In the *Wa-zai-kō* (page 282) it is stated that this medicine depresses or elevates the several *ki*, or spirits, and restores to health the organs of the *San-shō* (三焦 the parts of the body between the heart and groin, regarded as one of the six viscera, and are imaginary organs or passages, which are supposed to encircle the cavities of the thorax and abdomen, and connect the viscera; Chinese physiologists have used them as a convenient force to explain the obscure operations of digestion and secretion, and say that they have no form. *Williams*). Gōkōsan also removes obstructions; dissipates evil fevers and the bad influences of the pent-up spirits of the *In* and *Yō*, also the poisons of various fevers, pains of boils, and the glandular swelling of scrofulosis.

"The methods of treatment of disease, and means of preservation of life, seem to be diverse, while there are various modes of manipulating the body, of administering medicines by the mouth, of acupuncture, and cauterization; but there is nothing better than the leech<sup>72</sup> for curing small sores, and nothing better than the hot springs for the treatment of apoplexy and kakké (beri-beri)."

The employment of the *moxa* as a cautery, referred to above, has been known to the Japanese, and practised by them in the treatment of a variety of diseases, since ancient times. Kämpfer has given us in his History of Japan an excellent description of the mode of preparation of cones from the leaves of the *Artemisia vulgaris latifolia*, as well as the manner of applying this cautery, together

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72. Rengiyō-to, or decoction of Rengiyo, is composed of the following substances :

Rengiyō	連癭	Forsythia suspensa, <i>Vahl</i> ,
Shōma	升麻	Cannabis sp.,
Iōshō	芒硝	Saltpetre, about 64 grains each,
Gensan	支參	Ginseng sp.?
Shakuyaku	芍藥	Paeonia albiflora, <i>Pall</i> ,
Hakuren	白蓮	Vitis serjaniæfolia, <i>Bung</i> ,
Bōi	防己	
Yakan	射干	Pardanthus chinensis, <i>Ker</i> , 51 grains,
Daiwe	大黃	Rheum undulatum, <i>L.</i> , 70 grains,
Kanzō	甘草	Liquorice, 38 grains,
Kiyōnin	杏仁	Seed of the sour plum, 80 seeds.

These substances are to be placed in about 4½ gallons of water and boiled until but 1½ gallons remain. It is directed that the saltpetre, rhubarb, and the two following substances, shall be added in three portions. This compound is used to cure mastitis following parturition, and also in the treatment of carbuncle.

73 Mention is made in Japanese history of the employment of the leech in medicine as early as A. D. 732, and it is not improbable that it was known and employed long before that time.

with certain valuable observations upon the same. Besides this, several notices respecting the Japanese *moxa* have appeared in English and German. As these, however, may not be readily accessible, the insertion here, without going more fully into the subject, of a translation of the *Kiu-shiu Kagami*, or rules for the employment of the *moxa*, as given by Kämpfer, may perhaps not prove out of place. It reads as follows:

“CHAPTER I.

“1. In headache, swimming of the head, fainting fits, in *jōki*, or rush of blood to the head, in dimness of the eyes occasioned by a too frequent attack of *jōki*, in pains of the shoulder after headache, in asthma and shortness of breath, it is proper to burn that part of the human body which is called *kokō* (over the scapula).

“2. In distempers of children, particularly swellings of the belly, loosenesses, loss of appetite, in itch, and ulceration of the nose, as also in shortness of sight, the region of the fourteenth vertebra must be burnt on both sides with fifteen or sixteen cones, leaving about two and one-half inches distance between the two places which are to be applied to.

“3. In the *shaku* (cramp of the uterus?), in the *senki* <sup>290</sup> (enteralgia), and in *subako* (a kind of uterine disorder) you must burn both sides of the navel at three inches distance.

“4. In the obstruction of the menses, and in fluxes; in whites, in piles, and the ulceration of hæmorrhoids, and in the *tekagami* (an intermitting sort of cold, attended with pain and heaviness in the head), you must burn the place called *kisō* on both sides with five cones. To

find out this place, you must measure from the navel straight down, five inches, then sideways at right angles, 5 inches on each side; so that there be ten inches (9.6 in.) distance between the two places to be burnt.

“5. In a difficult delivery you must burn three cones on the extremity of the little toe of the right foot. This will give instant relief, and promote the delivery.

“6. In want of milk in nurses, five cones must be burnt between the two breasts in the middle.

“7. In arthritic pains and rheumatism, in pains of the legs, as also in strangury, or retention of urine, you must burn eleven cones on the thighs about three inches above the knees (or on the place for issues).

“8. In swellings and pain of the belly, in pain at the heart from a quotidian fever, in pain of the stomach and loss of appetite, you must burn six cones above the navel. The place which you are to burn must be five inches distant from the navel, in a straight line upwards.

“9. In pain of the hips and knees, for weakness of the legs in particular, and of all the members of the body in general, you must burn the place called *jushi* (*jushi* is that place on the thighs which one may reach with the extremity of his middle-finger, holding his hand straight downwards in a natural situation).

“10. Those who have a hardness and swelling in the hypochondria, as also those who have frequent shiverings, or relapses of putrid fevers, must be burnt in the place called *shomon* (just beneath the last false rib on each side).

“11. In urethritis you must burn in the middle of the place called *jokomon* (midway between the navel and the *os pubis*).

“ 12. Those persons who are subject to colds, bleeding at the nose, or swimming of the head, will find great benefit if they cause from fifty to an hundred cones to be burnt successively in the place called *jūn mon* (the region of the *os sacrum*).

“ 13. Those who are troubled with tumors and ulcers in the anus, must have one cone burnt three and one-half inches from the extremity of the *os coccygis*.

“ 14. In the procidentia ani, the *os coccygis* itself must be burnt.

#### “ CHAPTER II.

“ 1. Shinjin (the spirit of the stars) lodges in the spring about the twelfth vertebra, in summer about the eighth, in autumn about the sixth, and in winter about the seventeenth, and near both hips. For this reason care must be taken not to burn any of these places at the times above mentioned.

“ 2. Upon the turning of the four seasons of the year, you must avoid burning either the place called *shomon*; or the seventeenth vertebra, because, instead of being beneficial, it would rather prove hurtful, and increase the distemper.

“ 3. You must entirely abstain from burning in rainy, wet, or too hot weather, and on a cold day.

“ 4. You must not lie with your wives three days before, and seven days after the burning.

“ 5. Angry, passionate people must not be burnt before their passion is calmed; weary people, and those who are just come from their work, must not be burnt till they have rested themselves. The same rule is to be observed as to hungry people, or such as have eaten too much.

"6. People must abstain from drinking of *sake* (a spirituous liquor brewed out of rice) before they are burnt, but after the operation has been performed, it is not only safe but advisable to partake thereof, because it promotes the circulation of the spirits and the blood.

"7. Great care must be taken not to go into a bath of sweet water for three days after the operation.

"8. Medicines should be given to cure the distempers incident to our body, and the burning with the *moxa* should be ordered to preserve us from them. For this  
292 reason, even those who are otherwise in a good state of health, should be burnt twice a year—once in the second month (March), and once in the eighth (September). (The proper days for burning, and which are favored by the influence of the stars, are set down in their almanacs).

"9. You must feel the pulse you burn. If it be too quick, you must act prudently, because that shows that your patient has got a cold.

"10. The places to be burnt must be measured by *shaku* and *sun*s.<sup>74</sup> The length of the *sun* must be determined from the middle joint of the middle finger; in men in the left, and in women in the right hand.

### " CHAPTER III.

"Women who have done child-bearing must have three cones burnt on the navel.

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74. The Japanese measure of length, the *sun*, in the foregoing, has been, for convenience sake, reduced to English inches. A few other alterations in the text have also been made, and some of the less important notes of the translator omitted. Unfortunately, not having the original before him, the writer is unable to identify some of the medical terms used in the translation.



“CHAPTER IV.

“Women that would be glad to have children, must have eleven cones burnt on the side of the twenty-first (*i.e.* twenty-fourth) vertebra”

As explanatory of the above, it should be mentioned, that the little cones of mugwort rolled between the thumb and first finger, are placed upon the part to be cauterized, while the subject, if the place selected be the back, sits cross-legged, or upon the floor, with the body inclined forward. The cone is then ignited at its extremity, and by the time it has consumed away to the base, a cauteric effect has been produced upon the skin beneath.

In selecting the places most suitable for the application of the *moxa*, among other things, proximity to veins, arteries, and tendons, is to be avoided.

Frequent reference having been made in these notes to the medical theories and literature of the ancient Chinese, a brief notice of the subject, for the purpose of rendering more intelligible what has already been stated, as well as that which follows, may not seem here out of place.

Such a notice by one Paou Tso-Hwang<sup>75</sup> recently appeared in the *Han po*,<sup>76</sup> a Chinese newspaper published at Shanghai, and as it reviews the subject from a modern Chinese standpoint it is not without interest. Its most important portions are given here in translation.<sup>77</sup>

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75. 鮑佐恒 Hō Sa Kuwan.

76. A copy of which has been kindly furnished the writer by Mr. Shên Toh Interpreter to the Chinese Legation at Tokiyo.

77. For convenience in reference, the names of Chinese authors and medical works mentioned in this notice, have been given (as elsewhere in these notes) in accordance with the Chinese-Japanese pronunciation of the same (*i. e.* in Sino-Japanese). Whenever the Chinese pronunciation, however, is given, the system of transliteration employed by Wylie, in his Notes on Chinese Literature, has been followed.

"Medical art, as known to the ancient Chinese, owes its origin to the Emperor Shin-nō;<sup>78</sup> who having tasted of grasses, plants, and trees, became acquainted with their properties, and which knowledge he made use of in curing disease. He wrote a book on botany called the *Hon-so*,<sup>79</sup> which is also called *Shin-nō-kiyo*,<sup>80</sup> and is widely read even at this day.

"When the Emperor Ken-ye<sup>81</sup> ascended the throne, he conducted the government wisely; he sat in the hall called *Mei-do*,<sup>82</sup> made observations upon the ultimate end of man, and first recognized and named the five virtues—Charity 仁, Righteousness 義, Propriety 禮, Wisdom 智, and Fidelity 信. He held that human life has its back, so to speak, turned towards the *Yu* (*Yin*) or Passive Essence, while it embraces the *Yang*, (*Yang*) or Active Essence, or Principle; that it requires food which is of five kinds of taste, also clothes of five colors,<sup>83</sup> it is  
294 exposed externally to the stimulation of heat and cold, and is internally subject to the emotions of joy or anger; and concluded, that there are many remediable sicknesses, as well as many premature deaths. With the assistance of his teachers, Ki-haku, and Ki Yu-ku,<sup>84</sup> he sought out

78. 神農, Shin-nō; said to have invented the plough, and to have begun to reign 418 years after the deluge.—(Williams.)

79. 本草, *Pan ts'au*. (See page 272.)

80. 神農經, The Classic of Shin-nō.

81. 軒轅, Hien-yuen, the proper name of Hwáng-tè (Kō-tei). See page 261.

82. 明堂, See page 269.

83. The five tastes or flavors, according to Mayers, are—salt, bitter, sour, acrid, and sweet; and the five colors—black, red, azure (green, blue, or black), white and yellow.

84. 岐伯 and 鬼臾區.

the laws of heaven and earth,<sup>85</sup> and investigated the principle of the five elements,—water, fire, wood, metal, and earth, as compared with objects found in the world outside of the body, as well as within it. Reasoning thus with each other, they established the laws of medicine, which have through many ages been of great benefit to mankind. From this source, Rai-ko<sup>86</sup> received medical instruction, and the *Nai-kiyo*<sup>87</sup> was also produced.

85. The author here gives in a note the following explanation: "By the 'laws of heaven,' are meant the laws of the movements of the sun, moon, and stars, the blowing of the wind, the falling of rain, frost and snow: and by the 'laws of earth,' the laws of the four directions, east, west, south, and north, of lands, rivers, mountains, grasses, trees, etc. The objects which engaged their attention in the world around them, as external to the body, were such as birds, beasts, grasses and trees. Thus for instance, the spirit (氣) of birds and beasts is comparable with fire (火); their blood with water (水); the bones with metals (金); their fins (?) with wood (木); their flesh with earth (土). These all are endowed with the sensibility to joy, anger, sorrow, and pleasure. Considering the grasses and trees, we find them also endowed with certain natural characteristics. The branches, roots, leaves, flowers, and fruits, all have their special forms: they flourish at one time and at another decay; they bloom at one time and at another wither away; it is the law of their nature. The human body is considered as composed of five elements, comparable with the five external elements already mentioned; the heart with fire, the liver with wood, the lungs with metal, the kidneys with water, and the spleen with earth. Again, comparing the five external elements with the five cardinal virtues; charity corresponds with wood, propriety with fire, righteousness with metal, wisdom with water, and fidelity with earth. Kōtei (Hwāng-tè) discovered these principles from his own body, as shown in the following table:—

Five Internal Organs :	kidney,	heart,	liver,	lungs,	spleen :
Five Elements :	water,	fire,	wood,	metal,	earth :
Five Colors :	black,	red,	green,	white,	yellow :
Four Seasons :	winter,	summer,	spring,	autumn,	doyō,"

(Doyō, a period of 20 days in each of the four seasons).

86. 雷公.

87. 內經, Interior system.

- 295 "This work, the *Nai-kiyō*, was regarded with great respect during many ages, and by the observance of its teachings, errors in treatment have been avoided. In the time of the Chow<sup>28</sup> Dynasty, a man named Shin Kuwa-kuwan,<sup>29</sup> propounded the theory of the six spirits (六氣), which were: negative, positive,<sup>30</sup> wind, rain, darkness, and light: an account of which is given in the *Sashi*(左史), a history written by one named Sa (Tsō).

28. 周.

29. 秦和緩.

30. In the *Shi-sei-shin-yen* 四聖心源 the following description of the six spirits (breaths, or influences of Heaven) is given:

1. 厥陰風木 *Ketsu-in-fu-boku*. Short negative wind wood spirit. Wind is produced by the short or shallow negative woody spirit 厥陰木氣. The wind element of the celestial fire has its counterpart in the wood element of the earth, and in the liver of man; the woody spirit, when melancholy and oppressed, produces wind. The wind and wood elements stand opposed to the internal organs, and are the chief causes of sickness.

2. 少陽相火 *Shō-yō-shō-kewa*. Lesser positive spirit which ministers to fire. Heat is produced by this. In heaven it is heat, and on earth it is fire. In man it is *San-shō* 三焦 (one of the internal organs, the office of which is to take off the useless material from the system, and is divided into upper, middle and lower portions. See also page 288.)

3. 少陰君火 *Shi-in-kun-kewa*. Lesser negative controlling fire spirit. Heat is produced by this. In heaven it is fire. In man it is the heart.

4. 太陰濕土 *Tai-in-shōdo*. Greater positive damp earth spirit. Moisture is produced by this. In heaven it is moisture, and on earth it is the ground. In man it is the spleen. The dryness of the stomach cannot counterbalance the moistness of the spleen. It is very seldom that the earth gets dry; but often that it is wet.

5. 陽明燥金 *Yōmei-sō-kin*. Bright positive drying metal spirit. Dryness is produced by the *Yōmeikinkin* 陽明金氣, bright positive metallic spirit. In heaven it is dryness, and on earth it is metal. In man it is the great intestine.

6. 太陽寒水 *Tai-yō-kan-sui*. Great positive cold water spirit. Cold is produced by *Tai-yō-sui-ki* 太陽水氣. In heaven it is cold, and on earth it is water. In man it is the bladder. Internal organs which belong to the smaller positive are apt to get cold, and those which belong to the greater positive are liable to fever.

"During the age of Shun-jin<sup>91</sup> there lived a man named Hen Jaku<sup>92</sup> who elaborated several theories from the *Sa-shi*<sup>93</sup> in a work called the *Nankiyo*.<sup>94</sup> In the time of 296 the Western Han Dynasty there lived a man named Sōkō<sup>95</sup> who thoroughly understood the medical teachings of Hen Jaku. Chō Chiu-kei<sup>96</sup> appeared during the Eastern Han Dynasty, who compiled from the medical theories of *Nai-kiyo*, which he carefully studied, two books known as the *Kin-ki*<sup>97</sup> and *Shō-kan*,<sup>98</sup> leaving out not a single law or principle. Hitherto medical laws only were known; for no rules or methods of treatment had yet been determined.

"To Chō Chiu-kei, therefore, is due the credit of having established methods of medical treatment, which, as embodied in his work, have been recognized as the key to the medical practice of all the ancient schools. Indeed, such a man has not been seen since the day of Yentei Shinno<sup>99</sup> and Kō-tei Ken-yen.<sup>100</sup> Later, Kō Ho-hitsu,<sup>101</sup> in the time of the Tsin Dynasty (A.D. 265-322), wrote the book called *Kō-otsu-kiyo*,<sup>102</sup> whilst Yō Jō-zen,<sup>103</sup> in time of the Sui Dynasty (A.D. 589-619), originated or compiled the work known as the *Tai-sō-hen*.<sup>104</sup> In the same age there was a man named Kin Genki<sup>105</sup> who wrote a commentary upon this last mentioned work.

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91. 春秋 Latter part of Chow Dynasty B.C. 2122-255.

92. 扁鵲

93. 左史 See page 295.

94. 難經 See page 274.

95. 蒼公 See page 261.

96. 張仲景

97. 金匱

98. 寒傷(論)

99. 炎帝神農 Fire Emperor Shn-nung.

100. 黃帝軒轅 Yellow Emperor Ken-yen.

101. 皇甫謐

102. 甲乙經 See page 269.

103. 楊上善

104. 太素篇 See page 261.

105. 金元起

Later, numerous commentaries began to make their appearance, when all the writings then extant of the three emperors, Fuku-gi,<sup>106</sup> Shin-nō,<sup>107</sup> and Kō-tei,<sup>108</sup> were, for the first time, clearly explained. From this time there were no premature deaths either among the emperors, or their people; and the happiness of prolonged old age was enjoyed by all, in cities as well as in the country: and thus it came about, that the beneficence of these great and holy men, and especially that of Kō-tei, was extended through many ages.

"The first medical books in China were the *Sō-297 mon*,<sup>109</sup> and *Rei-sū*,<sup>110</sup> the *Yaku-hō*,<sup>111</sup> medical methods, or rules of prescribing, have been written since the Han and T'ang Dynasties (B.C. 206—A.D. 620—907). Those which belonged to the time before that, of Sōkō and Hen Jaku, have, if they existed at all, not been handed down to the present day. Medical books produced after the Sung and Yuen Dynasties (A.D. 960 and 1280) were all supplementary to older works.

"In after ages, how few there have been who have understood the whole extent of medicine; and now that the sources and springs of medicine (the earliest writers) are no longer so generally understood, how few there are who enjoy the happiness of long life!

"Our imperial ancestor, Jun Kō-tei,<sup>112</sup> being filled with pity on account of the sufferings of the people arising from irregularities of the seasons, as to cold and warmth, and also from want of proper hygienic regulations; and in order that the health and happiness of the people

106. 伏犧

107. 神農

108. 黃帝

109. 素問, See page 261.

110. 靈樞, See page 261.

111. 藥方

112. 純皇帝

might be increased, ordered a compilation to be made of all the works then extant, which work is now known as the *I-sō-k'in-kan*,<sup>111</sup> or Golden Mirror of Medical Doctrines."

Besides these, there are many valuable books like the supplementary works of Shiū Yo-shun,<sup>114</sup> the *K'in-ki*,<sup>115</sup> the *Giyoku-kei-k'in-ben*,<sup>116</sup> and three commentaries on the *Hon-zō*,<sup>117</sup> *Ben-on-netsu*,<sup>118</sup> by Go Kiku-tsu;<sup>119</sup> the *Rei-sū-Sō-mon*,<sup>120</sup> with explanations published by Chō In-an,<sup>121</sup> and Ba Gen-tai;<sup>122</sup> *Sho-kan-rai-sō-shū*,<sup>123</sup> by Shō Ten-shi<sup>124</sup> and Kei Gaku,<sup>125</sup> *Hatsu-shu*<sup>126</sup> by Jo Rei-tai;<sup>127</sup> *Ron-on-netsu*,<sup>128</sup> by Getsu Sei-haku;<sup>129</sup> *I-mon-hō-katsu*,<sup>130</sup> by Shō Kiyo-koku;<sup>131</sup> *Jū-hachi-shū*,<sup>132</sup> by Chūn Shiū yen;<sup>133</sup> and *On-netsu-kei-i*,<sup>134</sup> by Ō Shi-yū.<sup>135</sup> These books make clear the principles of medicine, and are of great benefit to the world. Medical authorities of more recent times, however, esteem only the *Shi-nan*,<sup>136</sup> by Rin-sho,<sup>137</sup> 298 *Zen-sho*,<sup>138</sup> by Kei Gaku,<sup>139</sup> and the *I-kuwan*,<sup>140</sup> by Cho shi.<sup>141</sup> The *Shi-nan* consists of numerous medical prescriptions, left in manuscripts by Shō Kō-gen,<sup>142</sup> and collected together and completed by his disciples after his death, and is inferior to such an original work as the *Sho-kan-zen-sei-shū*,<sup>143</sup> written by Kei Gaku himself. The *I-kuwan*

113. 醫宗金鑑

116. 玉經金辨

119. 吳菊通

122. 馬元臺

125. 景岳

128. 論溫熱

131. 草虛谷

134. 溫熱經緯

137. 臨證

140. 醫貫

143. 傷寒全牛集

114. 周楊俊

117. 本草

120. 靈樞素問

123. 傷寒來蘇集

126. 八種

129. 薛生白

132. 十八種

135. 王士雄

138. 全書

141. 張

115. 金匱

118. 辨溫熱

121. 張隱菴

124. 葉天士

127. 徐靈胎

130. 醫門捧喝

133. 陳秀園

136. 指南

139. 景岳

142. 葉香巖

is simply an illustration of the *Nai-k'yo*,<sup>144</sup> written by Chō Yō-ki,<sup>145</sup> wherein the principles of *tai-k'yoku* (太極), the infinites, and *mei-mon* (命門), gate of life (situated in the lower dorsal vertebrae and in the upper part of the *os sacrum*), are exclusively discussed; most of which is fallacious, and has no connection with sickness. The method of treatment is founded upon that of Setsu Chō-shu,<sup>146</sup> who employed two rules—those of the *roku-mi* 六味 and the *hachi-mi* 八味. The *roku-mi* or six medicines (tastes) were:—

- |            |    |   |
|------------|----|---|
| 1. Jiwo    | 地黃 | Rehmannia lutea, <i>Maxim.</i>                      |
| 2. Jikuchi | 熟地 | Mellow earth (?)                                    |
| 3. Yuniku  | 萸肉 | <i>Cornus officinalis</i> (fruit), <i>Williams.</i> |
| 4. Jitai   | 膩滯 | A medicine for indigestion (?)                      |
| 5. Onshoku | 溫瀉 | Warm astringent (?) <sup>147</sup>                  |
| 6. (?)     |    |   |

“The *hachi-mi*, or eight medicines were:

- |             |     |  |
|-------------|-----|--|
| 1. Jiwo     | 地黃  | Rehmannia lutea,                             |
| 2. Shiuyu   | 茱萸  | <i>Cornus officinalis</i> , <i>Williams,</i> |
| 3. Shioyo   | 薯蕷  | <i>Dioscorea japonica</i> , <i>Thunb.,</i>   |
| 4. Omodaka  | 澤瀉  | <i>Alisma plantago,</i>                      |
| 5. Bukuriyo | 茯苓  | <i>Pachyma cocos,</i>                        |
| 6. Botanpi  | 牡丹皮 | <i>Paeonia Moutan</i> (bark),                |
| 7. Keishi   | 桂枝  | <i>Cinnamomum Loureirii</i> , (bark),        |
| 8. Bushi    | 附子  | <i>Aconitum Fischeri.</i> ”                  |

“The two latter substances are acrid and produce  
299 heat, so that they should not be employed except in certain cases. Fearing that in after times mistakes might occur in the use of these medicines, Jo Kwai kei<sup>148</sup> wrote the *I-kuwan*<sup>149</sup> in explanation.

144. See page 296.

145. 趙養葵

146. 薛長洲

147. The writer is unable to identify these medicines.

148. 徐潤溪

149. See page 298.



“In the works written by Kei Gaku (景岳), and the doctrines of Chō kai-hin (張介賓), taken from the *Nai-kiyo* (內經), as opposed to the views of Shu Tan-kei (朱丹溪), and wherein the theory of the abundance of *In* (Yin), the Negative or Passive Essence, and the deficiency of the *Yō* (Yang), the Positive, is maintained, there are too many medicines which are warming, and even make hot, and especially in some of the new prescriptions called *hachi-jin*<sup>150</sup> (八陣). All these medicines are of one kind; they assist the *Yō* and oppose the *In*. Now the *In* is the blood, while the *Yō* is spirit (氣). When the spirit is in excess, then it becomes fire; when the *In* is deficient, sickness occurs; when it is exhausted or goes out, death takes place. If therefore we can but retain even a small portion of the fluid, or piece of the body, by so much will the life be lengthened; just as the oil supplies the flame, which will go out when the oil becomes exhausted. This principle is clear enough. Hence it becomes of great importance for the physician to lay hold upon the essence, so to speak, of the body, and retain therein its fluids; for those medicines which excite heat, waste away the spirit and the fluids. In the *Nai-kiyo* it is stated, that it is most important to sustain the spirit, and not to destroy the general harmony, or the spirit of harmonized warmth. It is also stated that one kind of water will not quench two fires.

“On looking over the symptoms of disease described in the *Nai-kiyo*, we find nineteen propositions, among which fire is the subject of five, heat of four, and cold of

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150. According to the author now quoted, *hachi-jin*, or eight camps, probably refers to the mode of encampment used by a celebrated Chinese General (諸葛孔明).

only one. Taking, for example, *shōkan* 傷寒 (cold sickness, *i.e.* fever resulting from cold): Cold is first felt, which, being transmitted through the system, is converted into heat. Thus it was, that, when asked by Ko-tei (黃帝) the reason that cold taken produces fever, Ki-haku replied, that heat is produced at the extreme point of cold; therefore, if one gets a cold in winter, he is  
 300 sure to suffer from feverishness in spring; for, if one is taken sick immediately after being exposed to cold in the winter months, it is *shōkan*, but if one does not suffer immediately after exposure to cold in winter, but is taken ill in the spring, warmth may be set down as the cause.

“Physicians of the present day do not understand, when they have to deal with *shōkan*,<sup>151</sup> that it is cold converted into fever as it traverses the system; but, having in mind the idea of cold only, they administer at random such medicines as:

Tōken 豆卷

Keishi 桂枝 *Cinamomum Loureirii* Nees, (branch, *i.e.* bark),

Gobō 牛蒡 *Lappa major*, Gaertn.,

Zeni 蟬衣 Cicada shell,

by means of which much injury has been done.

“On the other hand, let us take the following ridiculous case of the disorder called *ryō-kan-shō-kan*,<sup>152</sup> a kind of double fever, a dangerous sickness which has its origin in the *tai-yō-bō-ko-kei*,<sup>153</sup> or great positive bladder system, and the *shō-in-jin-kei*,<sup>154</sup> small-negative kidney-system of the feet, attacking from the inside, as well as the outside,

151. See page 299.

153. 太陽膀胱經

152. 兩感傷寒.

154. 少陰腎經

at the same time. Chō Chiū-kei used such medicines as:  
Bushichū tō 附子理中湯, a decoction containing aconite.

Shinbu tō 眞武湯

Shigiyaku tō 四逆湯

Hakutsū tō 白通湯

"In this case the cold attacks the urinary system, and it cannot be recovered from, without the use of such powerful medicines, as, *fuski* (aconitum Fischeri), which has the effect of restoring the positive.

"At the present time, there are many who suffer from this disease, and physicians say that it is contracted syphilis. They think it beyond doubt that it is caused by the negative spirit, and their treatment is as follows: a living pigeon is taken, and its abdomen opened, within which some musk is placed, and the whole laid upon the umbilicus of the patient; whereupon the crimson blood oozing out, the patient is forced to endure the unpleasant feeling and disagreeable smell, and the odor, passing through the nose, comes in contact with the brain (and effects a cure?)."

The author above quoted, here records his protest against such practices, stating it as his belief, "that there are but few physicians left who would part with a portion of the flesh of the thigh for the sake of their patients,"<sup>155</sup> and gives it as his opinion, that all this is due to the fact that the physicians of the day do not read the classics (the *Nai-kiyo* and books published after it), so that they remain ignorant and superstitious.

The following interesting sketch of the Siamese theory

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155. Probably referring to the Chinese proverb 醫有割股之心並無虛假之意, "A doctor has the heart to cut flesh off his patient, but never the mind to deceive him."—*Scarborough*.

and practice of medicine, from the pen of Dr. E.A. Sturge of Petchaburi, Siam, recently appeared in the *Philadelphia Medical Times* (Vol. XV, p. 51), and is given here to further illustrate the fact, that the medical theories held by the Japanese in the XVIth and XVIIth centuries are not unlike those held by other Asiatic nations to-day, and are undoubtedly of the same origin.

All nature, according to the Siamese, is composed of four elements,—namely, earth, water, fire, and wind. The human body is supposed to be made up of these same elements, which are divided into two classes, visible and invisible. To the former belongs everything that can be seen, as the bones, flesh, blood, etc.; to the latter, the wind and the fire. The body is composed of twenty kinds of earth, twelve kinds of water, six kinds of wind, and four kinds of fire.

The varieties of wind are as follows: the first kind passes from the head to the feet, and the second variety from the feet to the head; the third variety circulates in the arteries, forming the pulse; the fourth variety resides in the abdomen outside of the intestines; the fifth resides in the intestines, and the sixth enters the lungs in the act of inspiration.

The four kinds of fire are: first, that which gives the body its natural temperature; second, that which causes a higher temperature, as after exercise or in fevers; the third variety causes digestion, and the fourth causes old age.

The Siamese divide the body into the thirty-two parts, as the skin, heart, lungs, etc. The body is thought to be subject to ninety-six diseases, due to disarrangement of the earth, wind, fire, and water. An undue proportion of fire causes fevers, and dropsies are caused by too great a proportion of water. Earth is supposed to produce disease by invisible and impalpable mists and vapors, and wind can cause all manner of complaints. Nine out of every ten natives, when asked what is the matter with them, 302 will answer, "Wind." (Not long ago, on our way to Bangkok, we found a man dead upon the river-bank. The boatmen were speculating as to the cause of the man's death; but the oldest man in the company soon settled the matter by gravely remarking that, in all probability, it was due to wind.) It is thought that the external elements are constantly acting upon the elements composing the body, causing health or disease. Thus, in the hot sea-on, the Siamese believe we are more liable to fevers, and in the rainy season to dropsies, due to too great an absorption of

water. Spirits are also supposed to have great power over our bodies, deranging the elements and thus producing all manner of maladies. One of our young men remarked not long ago, while travelling in a rather lonely portion of country, "I am not afraid of tigers, but I do fear spirits." The Siamese have numerous spirit-doctors, and many are the propitiatory offerings made to the immaterial beings that fill the air.

In the time of Buddha, lived one still worshipped as the Father of Medicine. To him, it is said, the plants all spoke, telling their names and medical properties: these were written in books, and have become sacred. If they fail to produce the results ascribed to them, the fault is never theirs, but is due entirely to want of merit in either doctor or patient. The natives use almost everything as medicine; the bones and skins of various animals occupy a large part of their pharmacopœia, while the galls of snakes, tigers, lizards, etc., are among the most valuable of their medicines. Most of the Siamese remedies are very complicated, being composed of scores of different ingredients. The following is an absurd recipe for snake-bite: A portion of the jaw of a wild hog, a portion of the jaw of a tame hog, a portion of the jaw of a goat, a portion of goose-bone, a portion of peacock-bone, a portion of a fish, a portion of the head of a venomous snake: these, being duly compounded, form a popular remedy when the venom has caused lockjaw. Burnt human bones, powdered and mixed with an equal portion of powdered alum, form a favorite medicine for sprinkling on ulcers. The eye-teeth of tigers, bears, lions, and various other animals (the more the better), ground up together, form the most popular remedy for fevers. The ashes of earthworms and human hair, mixed with cocoanut-oil, is frequently used for cuts. Every native physician has an image of Pra Ruse, the father of arts, in his house. All drugs are first placed in this idol's hand and receive his blessing; afterwards they are taken to the patient's house and boiled in earthen pots, a wicker-work star always being placed above and below the drugs, to prevent the spirits from tampering with them. In all fevers the doctor fills his mouth with some concoction and squirts it over the naked body of the patient in a fine spray, exactly as the Chinese laundrymen sprinkle clothes.

Dissection is never practised among the Siamese, consequently they are grossly ignorant in regard to the science of anatomy. The writer has not unfrequently seen them hew a body in pieces with a cleaver at least two feet long, but very little is ever learned from these rough post-mortem examinations. They are usually made with the expectation of

303 finding one or more tumors in the abdominal cavity, which they suppose to be the work of witchcraft. They usually are successful in finding what they look for. Sometimes the spleen, at other times a kidney or some other normal organ, is mistaken for an abnormal growth inserted in the body by superhuman agency. The functions of the different organs are not at all understood. In the heart is supposed to be a cavity about the size of an almond. This cavity is thought to be filled with a fluid which changes its color and consistency with our passions. When we are calm and peaceful, this fluid is perfectly clear, like water; when we are angry, it is turbid; when very angry, it turns dark; and when we are in love, it is red. In stupid persons the apex of the heart is rounded, while in those possessing the usual amount of wisdom it is pointed. It is not known that the heart has anything to do with the circulation.

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#### IV. INTRODUCTION OF WESTERN MEDICINE, AND THE REVIVAL OF THE CHINESE SCHOOL; FROM THE MIDDLE OF THE XVTH CENTURY TO THE BEGINNING OF THE PRESENT REIGN.

(1868).

Reviewing the history of the previous period, it appears that, since the middle of the XIIth century the interest in medical pursuits diminished greatly, owing in part, it is said, to the turning of the attention of the better classes to political affairs, and the spread of a military spirit, which drove men from more peaceful pursuits to political intrigue, and to seek fame in arms.

The examination of physicians had now long since ceased, and with this relaxation on the part of the Government, the standard of medical attainment was gradually lowered by the profession. Indeed, such was the state of affairs at the end of this period, that medical

priests again began to practice, and were even summoned to the court, where the office of court physician, once filled by descendants of the celebrated houses of Wake and Tamba, had for some time been vacant, and the methods of the *Wa-sai-k'yoku-hō*,<sup>1</sup> formerly adopted by the "Go ten yaku," the five superintending physicians, Wake, Tamba, Saka, Taketa, and Yoshida, had fallen into disuse, and were finally replaced by those of the Chinese Schools of Ri To-yen<sup>2</sup> and Shu Tan-kei.<sup>3</sup>

Mr. Kōchi Zensetsu tells us that Ri To-yen was born 304 during the Yuèn Dynasty (A.D. 1280–1368), that he was a pupil of Cho Gen-so,<sup>4</sup> and believed internal diseases to be caused by the penetration of pestilential vapor from outside the body; and those of the stomach by improper food and over-exertion.

The works he employed in his teachings, it is further stated, were those known as the *Hi-i-ron*,<sup>5</sup> and the *Nai-gai-shō-ben-waku-ron*,<sup>6</sup> and that his treatment was always directed first towards the stomach and intestines, in order that the condition of these organs might be restored to that of health. Mr. Kaku Kashiro states that Ri To-yen was the founder of an eclectic school, the doctrines of which were based on the teachings of the *Sōmon*,<sup>7</sup> *Rei-sū*,<sup>8</sup> and other works down to the time of the *Shō-kan-ron*,<sup>9</sup> by Chu-kei;<sup>10</sup> that he advanced the theory called "*ho chiu-yeki-ki*,"<sup>11</sup> literally, "assisting the interior and increasing the spirit"; he also put forward the theory

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| 1. 和劑局方  | See page 288.        |        |
| 2. 李東垣   | 3. 朱丹溪               | 4. 張元素 |
| 5. 脾胃論, A discourse upon the spleen and stomach, |                      |        |
| 6. 內外傷辨惑論  | 7. 素問, See page 296. |        |
| 8. 靈樞, See page 296.                             | 9. 傷寒論 p. 296.       |        |
| 10. 仲景 pp. 296,                                  | 11. 補中益氣             |        |

called "*go-giyo-un-ki-so-fu-haito*,"<sup>12</sup> or, literally, "the circulation of the five elements among the internal organs."

According to the last mentioned writer, Shu Tan-kei, or Shu of Tan-kei, was born during the reign of the Yuên Dynasty. He was thoroughly acquainted with such works as the *So-mon*, *Nankiyo*,<sup>13</sup> and *Shō-kan-ron* by Chiu kei, and familiar with the teachings of Ri To-yen, whose views he, for the most part, accepted. These, together with his own, he published in the work called *Kaku-chi-yō-ron*,<sup>14</sup> or, Educational Observations and Discussions, which is essentially an expansion of the views of Ri To-yen. He also compiled a work known as the *Wa-sai-kiyoku-hō-hak-ki*.<sup>15</sup> From these two teachers sprang the later Chinese schools, which were known as Ri-shu-no-riu, or the schools of Ri (To-yen) and Shu (Tan-kei). They were also known as the schools of the direct and indirect principles. Tashiro Dōdō, also called Sanki, was the first to teach the doctrines of these schools  
305 in Japan. He was born in A.D. 1465, and spent twelve years in China, where he became acquainted with the teachings of Ri-To-yen and Shu Tan-kei; and upon his return brought the Chinese books, and taught what he had learned during his absence.

To Manase Shōkei, who has been called the reviver of medical learning, perhaps more than to Tashiro Dōdō, is due the honor of having most successfully propagated the doctrines of these schools. Manase was born in A.D. 1507, and was reared in a Buddhist temple at Kiyoto. In 1531 he came under the instruction of Dōdō, having before this entered the Ashikaga Gakko,

12. 五行運氣藏腑配當

14. 格致餘論

13. See page 296.

15. 和劑局方發揮



a famous school in Ashikaga Kodzuke, one of the Eight Provinces (Kuwanto) in the vicinity of Yedo (Tokyo). Later, he held important posts under the Shogun Ashikaga Yoshiteru, and also under Hideyoshi, and Iyeyasu, the first of the Tokugawa line. He successfully treated the Emperor Ogimachi, who was afflicted with a most severe disorder.

Among his numerous writings is mentioned the *Kei-tcki-shū*,<sup>16</sup> a work intended to draw attention to the writings of the older authors, and one which was widely circulated by order of the Government.

In the *Kō-koku-i-jī-yen-kaku-shō-shi*,<sup>17</sup> it is stated, that this school of Takashiro and Manase, called the *San-ki-rū*, held that great attention should be given to the appearance of the feces and urine, as indicative of the location of the disease, which, when these excreta are normal, cannot be in the inner organs, and must be without the circulatory system. The causes of disease were considered to be heat and moisture, and therefore, in treatment, the first thing to be done, was to draw off moisture; and to this end, *Happiyo-sai*, a kind of diaphoretic mixture, was always employed.

Manase Gensaku,<sup>18</sup> sometimes called Shosho, son of Manase Shōkei, also took active part in propagating

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16. 啓迪集

17. 皇國醫事沿革小史 p. 246.

18. The syllable *Gen*, so often forming a part of the *na* (with us the baptismal name) of physicians, was, it is said, at first, used in honor of *Gensaku*. It should be mentioned that in Japanese the family name is usually written *first*, followed by the individual name, or *na*: which latter, it is not infrequently the custom to change on certain occasions, such, as for instance, upon coming of age, entering upon office, or receiving distinguished promotion; also upon a son succeeding the father as head of the family, when the *na* adopted is often patronymic.

the doctrines of the school which his father had founded, and which soon spread all over the country.

Japanese medicine also found an enthusiastic reviver in Nagata Tokuhon,<sup>19</sup> a native of Mikawa, but who served under the Daimiyo Taketa of Kai, and for this reason was often called Kai no Tokuhon. In the "Outline History of Education in Japan" it is stated that he was the author of "nineteen medical doctrines; and having introduced many new ideas, and making use of powerful remedies, became noted for the effectiveness of his treatment." Mr. Kaku states that Nagata held the object of medical art to be, to help and protect the *riyō no* (良能), or natural instinct (the *vis medicatrix naturæ*); and it is related of him, that on one occasion, a certain nobleman having been taken sick of a fever, and Tokuhon having been called in to give his medical opinion, the first thing he did, was to ask the sick man what he liked and disliked most; to which the latter replied, that he should like to eat some water-melon, to have all of his clothing removed, and to have the screens taken from around him; which accordingly was permitted, and further, he was allowed to drink cold water, a procedure prohibited by the physicians of the Chinese school, Tokuhon's conviction being, that Nature herself gave indications as to what the system was most in need of. Again, it is stated by the same author, "that upon meeting with a person suffering from any nervous disorder, he gave little attention to the medical treatment; but rather searched for the causes of the disorder, and often resorted to effecting a cure by working upon the mind of the patient; thus, for instance, were the patient

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19. Born A.D. 1512, died 1630, aged 118 years.

a farmer, and anxious that it should rain, he would speak to him of the probabilities of a coming storm; were she a woman, complaining at the absence of her husband, he would assure her of his speedy return; or if a young girl, converse with her about marriage; and so, sometimes by exciting anger, and sometimes sorrow, through some bond, or by physical pain, and sometimes through fear, he brought his patients into health, or into that condition in which they would be best reached by medicines."

Having thus briefly described the state of medical affairs at the middle of the XVIth century, and the beginning of the fourth period, we now come to consider the <sup>307</sup> most important series of events in the Medical History of the country (and as well, it may be said, in its political history), namely; the discovery of Japan by the Portuguese; its intercourse with foreign nations; and the influence of that intercourse upon the systems of medicine known to the Japanese.<sup>20</sup>

Although the history of this period is quite well known, the following, from a manuscript document, may not be out of place; for it is said to be a portion of the official records of the early introduction of Christianity into Japan, and hitherto unpublished, as the writer has been informed by Mr. Tsuda Sen, through whose kindness a copy of the original was obtained.

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20. Kochi Zensetsu states, the Europeans first appeared in Japan in the 12th year of Ten-bun (A.D. 1543), and that they were Portuguese, and were over 100 in number. Guided by a Chinese, they landed on Tanegashima, one of the islands of Kiushu, and made known their desire to enter into trade with the inhabitants of the island by drawing pictures in the sand with their sticks. They induced the governor of the island to purchase a fowling-piece, and to allow one of his retainers to be instructed in the art of using it.

"In the reign of the Emperor Ogimachi (A.D. 1558-1586) there stood in Kiyoto a Buddhist temple, which until that time was known as Yei-roku-ji (temple of Yei-roku)<sup>21</sup> Its name, however, was changed by Ota Nobunaga to Nam-ban-ji (which name was derived from that applied by the Japanese to the two countries of Spain and Portugal,<sup>22</sup> then known as the Country of Nam-ban, or the Southern Barbarians).

"It is said that the King of Nam-ban called together a national assembly, to consider the advisability of sending presents to Nam-ban-ji, supplied from the revenue of the five countries which constituted his kingdom.<sup>23</sup> Nam-ban then sent to Japan two celebrated doctors, who lived at Hiko, in the south of that country, with Futen Bateren,<sup>24</sup> a religious friend of Urugan, who had visited Japan before.

"These, approaching Japan in a ship laden with many precious things, landed on the island of Oki, deeming  
308 ing Hizen an unsuitable place for the furtherance of their plans<sup>25</sup> The governor of this island, however, having heard of their arrival, and fearing that their presence might result in immediate trouble to his country, or perhaps involve it in war in the future, sent an interpreter to examine this craft of Futen's, and made preparations at once to drive them away. The governor, upon being told, however, that they had come from Nam-ban

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21. Year-period, A.D. 1558-1569.

22. And afterwards to Portugal alone.

23. Satow, Asiatic Soc. Trans. Vol. VI. Pt. I. p. 46.

24. Portuguese, *padre*, probably Louis Froez, priest: Urugan, probably Organtin Gneccchi, priest.

25. Hizen had previously been the base of operations of the Portuguese traders.

upon the invitation of Ota Nobunaga, and that they would not submit to examination, allowed them to remain. After a certain number of days, they again set sail for the harbor of Obama in the province of Wakasa, reaching which, they proceed to Kaidzu in Ōmi, and thence by boat on Lake Biwa to Otsu, and speedily arrived at Nam-ban-ji in Kiyoto, where they met with Urugan. They lodged for four or five days at the Buddhist temple called Miyo-hon-ji, at Adzuchi, after which they proceeded to the castle of Ota Nobunaga, and were introduced to that personage by one Hasegawa; on which occasion they presented to Nobunaga the precious things they had brought with them from Nam-ban. These consisted chiefly of emeralds, aloes wood, agate, and tiger skins. Futen, it is stated, was a very tall man, measuring ten feet in height (!), his complexion was pale, and his hair of a yellowish color; whilst his carriage was much like that of Urugan. Although looked upon by Nobunaga as strange persons, they were nevertheless commanded to teach the doctrines of the Christian religion to the people, which religion soon spread all over the city of Kiyoto. This was the beginning of the propagation of Christianity in Japan.

“These four persons, Futen, Urugan, and the two doctors, consulted frequently together at Nam-ban-ji as to the best means of bringing the country into subjection to their King, Kai-shu-pi (Philip II of Spain and Portugal), by whom they had been sent for this purpose. With this purpose in view, and believing, that only by worthy deeds towards the people, could they expect to gain their object of spreading their religion throughout the land, they began by extending help to the poor,

and by presenting a petition to the government, asking to be given some public lands whereon they might cultivate herbs of rare medicinal virtues for the healing of those sick with difficult diseases. The Government at once granted them the use of 30,000 tan of land (about 7,500 acres) on the slopes of Ibikiyama, a mountain in the province of Ōmi, where they planted some 3,000 different kinds of medicinal herbs and trees, and which in two years grew abundantly, producing medicines by means of which many sick persons were healed. The surgeons of Nam-ban, too, Japanese historians state, proved far more skillful than those of this country, rapidly curing many folk sick with diseases considered more difficult to heal."

In the *Ni-hon-sei-kiyoshi* it is stated, that all the missionaries in Yamaguchi, Hirado, and Hakata, being, in the second year of the Yei-roku, (A.D. 1559), obliged to leave those parts, on account of the disturbance caused by some evil spirits, thereupon collected together at Funai in Bungo; these were Cosme de Torrez,<sup>26</sup> priest and superior, Balthazar Gago, priest, Gaspar Vilela, priest, Jean Fernandez, brother, Guillaume, brother, Toma (probably Edouard de Sylva), brother, and Louis Almeida, brother. There were also natives who had been baptized into the Catholic faith, and lived among the missionaries; their names were; Laurent, a native baptized by Francis Xavier; Melchior, who accompanied Torrez from Yamaguchi; Paul, a celebrated physician, who treated patients at the Kiu-sai In, a hospital established for the purpose

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26. The writer is indebted to Rev. l'Abbé Evrard, of the Legation of France, for the identification of these names in French, which, as they appear in the Japanese, are almost unintelligible.

of caring for the sick poor under the direction of Louis Almeida and Domitien. The two latter gave instruction for the purpose of affording a Christian education to youths whose fathers, or elder brothers, had embraced the Catholic faith, and who had hitherto been compelled to obtain their education at Buddhist temples.

Among these missionaries there was one, who was himself an excellent Japanese scholar, and who deemed it of great importance to establish a church and a Christian college, in which the natives might be instructed in Japanese learning, and thus to introduce a better condition of moral excellence, and to increase their general intelligence.

These missionaries entered industriously upon their work, which brought them such success, that, at one time, the Japanese at Funai and its neighborhood <sup>310</sup> flocked to the preaching place in so great numbers that it was impossible for all to gain entrance, and a temporary building had to be erected in front of the gate for their accommodation.

The establishment of a still larger hospital than the Ko-shitsu In, already founded, was soon brought to a successful completion, which institution included, besides twelve large wards, special places for religious service and medical purposes.

Whenever poor patients were received into the hospital, they were kept under treatment until fully cured, and their expenses were defrayed by the Portuguese and Japanese Christians. Pleased with such benevolence, Providence, we are told, "manifested his divine power and favor, by giving success to their efforts to cure the sick."

In the posthumous work of Sugita Genpaku, entitled

*Ran-gaku-koto-no-hajime*,<sup>27</sup> or, The Beginning of the Study of Dutch, it is stated, that the first school of Western medicine, or rather, of surgery, in Japan, was that known as the "Nam-ban-riū," or, School of the Southern Barbarians (Portuguese); and was founded by those surgeons who practised their art according to the teachings of the Portuguese physicians, who had come to Japan in the trading ships, during the time in which their countrymen were permitted to carry on trade with this country, and more especially, between the years 1542-1580. Toward the close of the sixteenth century, the Dutch made their appearance in Japan; and later, after the establishment of the factory at Deshima, Nagasaki, Dutch physicians gave instructions in Western practice of surgery and medicine. This event gave rise to a Dutch school of surgeons,<sup>28</sup> to which Japan owes a great debt; and of the untiring and self-sacrificing zeal of the followers of which she may justly feel proud. At first, the instruction received was derived from the lectures and clinical practice of the Dutch, which the Japanese were only permitted to note down after the lectures, from memory. The  
 311 knowledge thus obtained must have been at first very meagre; for at that time none were permitted to read the books of the Dutch, and their acquaintance with the foreign tongue was limited to a few phrases.

It is stated, that, as the Dutch employed remedies which could not generally be obtained in Japan, other

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27. 蘭學事始, A translation by Mr. Mitsukuri of portions of this work appeared in Vol. v. pt. i. of the Asiatic Society Transactions, an extract from which appears in another place.

28. Sugita states, that in the year A.D. 1632, many physicians and surgeons came with the vessels of the Dutch company and taught the Japanese surgery and physiology.



remedies obtainable in this country were substituted in practice. Indeed Western medicine can hardly be said to have been practiced to any extent in Japan until within the past few decades of the present century.

Prominent among the followers of the new schools, was Nishi Gempo, or Gempo Sensei (Master Gempo), who had formerly been an interpreter to the Portuguese, but upon their expulsion became an interpreter to the Dutch.

The school of surgery founded by Nishi was known as the *Nishikirū*, or School of Nishi, and was sometimes called *Riyo-riū*, Eclectic School; because it combined the teachings of both the Portuguese and Dutch. Nishi, having gained great renown for his skill, received the appointment of surgeon to the Shogun, and was the first in the Government service to give instructions in physiology as taught by the Dutch.

Another prominent surgeon, and the founder of a school of surgery, was Kurizaki Doyu, who was, it is said, of Portuguese extraction, and who, as he had received a medical education from the foreigners, and yet had not embraced their religion, was permitted to return to Nagasaki, after the expulsion of the Portuguese and those of mixed parentage. He exhibited great skill and learning, for which he became very noted. Yoshida and Uriu, both Dutch interpreters, established schools which bore their respective names. Another school of note was that established by a pupil of Ranzan Hōan, physician to the lord of Hirado. Ranzan, it is stated, received his medical education with the Dutch, at Nagasaki. The name of this pupil was originally Morishima Hōchiku of Yamato, but afterward it was changed by himself to

Katsuragawa,<sup>29</sup> out of compliment to his teacher Ranzan—meaning thereby, that, as the river Katsura finds its source in Arashiyama (or, in Sinico-Japanese Ranzan), a mountain near Kiyoto noted for its beautiful scenery, so  
 312 had he found in his teacher, Ranzan, the source of all his knowledge.<sup>30</sup> Hochiku also received some instruction from the Dutch at Deshima, on the occasions of the visits he made with his teacher to Nagasaki. The names of the Dutch surgeons at Deshima at this time, according to Sugita, were Danner and Arumans. Sugita states, that in the year 1644, a Dutch ship was cast upon the shores of the sea of Yamada of Nambu, on board of which vessel was a surgeon named Kasper, who, with the other Dutch found on the vessel, was sent to Yedo,

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29. The river Katsura.

30. The following story illustrative of the character and attainment of one of the members of this family of Katsuragawa, has been related to the writer by a friend: On a certain occasion, when several of the physicians of the Shogun's Court were conversing together, Katsuragawa was charged with forsaking the traditions of the ancients, neglecting to give to the phenomena of the pulse the important position it was justly entitled as a means of diagnosis, and running after the foreigners and their fallacious teachings. Upon this he left the room suddenly, as his colleagues thought, to hide his shame, but soon returned, and informed them that he had a curiosity to shew them, and requested that they would examine his pulse. Examination shewed that the right pulse was quite imperceptible, while the left was of normal strength; whereupon they declared that some dire disease had overtaken him, and that he would soon be carried off. Much to their mortification, however, pulling up the sleeves of his loose *haori* and shewing them a knotted handkerchief pressing over the brachial artery, he assured them that his life was not in the slightest danger, but that, on the contrary, he hoped it would be spared him yet many years, that he might see the progress of the foreign school from which he had first learned the fact of the circulation of the blood.

where during his two or three years' stay he instructed a number of Japanese. Subsequently he took up his residence at Nagasaki, where he continued to teach many of his former pupils, and became, it is thought (although not positively known), the founder of the school of Kasper.

There was also a school of surgery known as that of Yoshiwo, the founder of which also obtained his knowledge of surgery from the Dutch.

Sugita, writing in the next century, states, "that in looking over the works upon surgery, transmitted from the founders of these different schools, there can be found nothing, save a few formulæ for medical plasters, oils, etc.; which, however," he remarks, "together with the notes on surgery therein, were far superior to the Chinese or Japanese methods theretofore employed." Of the old Japanese school of surgery was Takatori Hidetsugu, the founder of a school bearing his name. He wrote the *Ge-kuwa-sai-zen*,<sup>31</sup> a minute examination of surgery, and *Shim-mei-sui*,<sup>32</sup> a collection of new discoveries.

As to the Chinese and Japanese surgical practice mentioned by Sugita, a description given by Mr. Kaku, of the views of Hanaoka Shin, also called Hakkukō, or Seishiū, although rather advanced, and of a later day, will throw upon the subject. It is said of Hanaoka that he was a native of Kishiū, that he came of a family of physicians, and received instruction in medicine from Yoshimasu Tamenori, and in surgery, from Yamato Kensai. He travelled extensively, and on his return home, taught the following doctrines:—"There is no distinction in principle between ancient and modern medi-

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31. 外督細整.

32. 新明集.

cal treatment, while in the treatment of internal and external disease the principle is one: if, therefore, we permit ourselves to be biased toward the teachings of the ancients, we may fail to understand those of the men of to-day; while if we do not consider the internal condition of the body, how can we treat understandingly those diseases which manifest themselves externally? The Dutch physicians are most minute in theory, but rough in their mode of treatment: Chinese science is indeed minute, or accurate, in practice; but is restrained by the theories of the past. Therefore, as to treatment, I look to the living body alone for indications, seeking for the mode, afterwards, from philosophers; and am consequently not restricted to rules in giving remedies, but act as necessity demands. When medicines are ineffectual, as well as acupuncture and the cautery (*moxa*), the abdomen and back may be opened, the stomach and intestines washed, and whatever is likely to save the patient, may be done."

In attempting such bold surgery, he employed a narcotic composed of the following ingredients.

Mandarakuwa	曼陀羅花	<i>Datura alba</i> , <i>Nes</i> ,
Sōutō	草烏頭	<i>Aconitum (ferox?)</i> , <i>Smith</i> ,
Hakushi	白芷	<i>Angelica anomala</i> , <i>Pall</i> ,
Tōki	當歸	<i>Ligusticum acutilobum</i> , <i>Sieb et Zucc.</i>

Senkiu	川芎	<i>Conioselinum univittatum</i> , <i>Turcz</i> ,
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- 314 A decoction of these five substances reduced to minute powder was administered to the patient, who at once became unconscious: whereupon the operation was performed. Among the different kinds of surgical diseases operated for, and which other physicians would not treat,

are mentioned carcinoma mammae, necrosis of bones, fistula ani, scrofulosis, and benign tumors. Such operations were performed at one sitting; the after-treatment being hot water and a plaster. Such was his success, that he gathered around him many followers, while patients suffering from diseases considered incurable flocked to him from all quarters for treatment.

A pupil of Hanaoka, named Honma Gencho, a native of Mito, and also known as Kiyokuken, embodied the teachings of his master, together with his own experience, in the work called *Chō-kuwa-hi-roku*.<sup>33</sup> Honma was the first to operate for aneurism by incision, and also to ligate arteries.

Returning again to the subject of Chinese and Japanese medicine, and to the early portion of the period under consideration, we find that the first event of interest following the occurrences already described, was the re-establishment of the dispensary, in the year A.D. 1590, by Toyotomi Hideyoshi; over which Seiyaku-in Zenshiu,<sup>34</sup> a pupil of Shōkei Manase,<sup>35</sup> and a descendant of Tamba Yasuyori, was appointed Director. A little later, one Nagasawa Dōju, a native of Tosa, and a pupil of Manase Shōsho,<sup>36</sup> made certain divisions in the course of medical study, founded, it is stated, upon the *Sho-gaku*,<sup>37</sup> or, Lesser Learning, and the *Dai-gaku*,<sup>38</sup> or, Great Learning. According to Mr. Kaku, there were, in the elementary or primary course, seven divisions of study, namely:—

33. 瘍科秘録.

34. Chief of Dispensary, Zenshiū.

35. See page 305.

36. See page 305.

37. 小學 Seaōu héu, by Choo He, and arranged by his pupil Lēw Tszè-ching.—*H'yliz*.

38. 大學 or Superior Lessons, by Confucius; the first of the four books.

"1. To distinguish the nature of medicine, whether of negative (*In*) or positive (*lō*) qualities, also their therapeutic value. Of medicines there were more than three hundred different kinds.

315 "2. To distinguish the original object of ancient prescriptions, as well as to understand the method of making them up. There were over three hundred prescriptions in number.

"3. To understand the great rules of medical treatment, of which there were about fifty.

"4. To prescribe according to one's own judgment, after having studied the ancient medical tables, in number more than five hundred articles.

"5. To distinguish the different conditions of the pulse.

"6. To distinguish the so-called hollow spots on the back in the application of the *moxa* and in acupuncture. There were over one hundred spots in number.

"7. To study those medical works containing written prescriptions, of which there were over ten in number.

"Again, following the divisions, or eight works, of *Sōkō*<sup>39</sup> he established eight divisions of study of the senior course. These works of *Sōkō* are:

*Kō-tei-Hen-jaku-Miyaku-sho-jō-ge kiyo* 黃帝扁鵲脈書上下  
經, a work containing the views of *Kō-tei*<sup>40</sup> and  
Hen Jaku<sup>41</sup> upon the pulse.

<i>Go-shiki-shin</i>	五色診	Diagnosis by the Five colors.
<i>Ki-kō</i>	奇恒	Remarkable Laws,
<i>Ki-do</i>	揆度	Medical Considerations,
<i>Yaku-ron</i>	藥論	Discourse on medicines,
<i>Seki-shin</i>	石神	Stone gods, i.e. medical stones,

39. See pages 261.

40. See page 296.

41. See pages 285, 295.

*In-yō-guwai-hen* 陰陽外變 External changes of the *In* and *Yō*.  
*Setsu-in-yō* 接陰陽 Interchange of the *In* and *Yō*.

The divisions in the course of study were as follows:

"1. To study the beginnings and endings of the nerve fibres, in relation to the hollow spots on the back; and thus to become acquainted with the locality of the disease in the body.

"2. To ascertain the extent (*i.e.* force or power) of the vital circulation, and thus to learn the locality of disease.

"3. To ascertain the length and extent of the muscles, <sup>316</sup> bones, integument, blood vessels; also the nine orifices (the eyes, ears, mouth, etc.), and thus to be able to know the locality of disease.

"4. To ascertain the condition and functions of the viscera and their appendages.

"5. To ascertain the normal and abnormal conditions of the circulation of the vital spirit, and thereby to be able to indicate the causes of disease.

"6. To learn the four methods of diagnosis.

"7. To learn to recognize the indications of death.

"8. To ascertain the predisposing and immediate causes of the several varieties of colds, and also those diseases arising from fatigue, improper food, and improper appetites, and to determine the manner of treatment, whether by acupuncture, cauterization, or by the administration of medicines."

During this period, and as in ancient times, those who followed the study of medicine were not always from among the ranks, strictly speaking, of medical men; but often it happened that those whose profession was literature, took up the medical branch of that subject, and

published their views in numerous works of no little value. Among such scholars, was Nabika Riyo, perhaps best known by the posthumous title of Kanriyo Tenmin, a native of Tamba, and resident of Kiyoto. He himself practiced medicine because he thought that every scholar should have some fixed means of support, in order that he might be enabled successfully to pursue his object of study. Among the pupils of Nabika were several who afterwards became noted physicians, also famous for their scholarship. Such were Watanabe Shinzō, Shimidzu Keichō, Matsubara Keiho and Fujita Sadayū. Among these men were some who advocated a re-adoption of the views of the ancient schools, notably Butsu Sorai, and Ito Jinsai. Mr. Kaku, in referring to this class of men, says:

“There were many literary men who, intruding upon the domain of medicine, wrote commentaries on medical works with popular explanations; and who, often following too closely the letter, and mistaking the real meaning of the text, bred confusion among those who relied upon these erroneous explanations.” They held, however, that he  
 317 who practised medicine should be possessed of charity, integrity, intelligence and good nature; and that he should be acquainted with literature, established in conduct, and faithful. The man who did not come up to these requirements, they likened to fur, “which finds no sticking place when there is no skin to support it.” Among those, however, who although of this class, produced works of considerable practical value, is (mentioned by the writer above referred to) Okamoto Ippō of Kiyoto, who wrote numerous explanatory works for young students. Among his works were the following:



難經諺解 *Nan-kiyo-gen-kai*, or Popular explanations of the *Nan-kiyo*.<sup>42</sup>

和語本草綱目 *Wa-go-Hon-zō-kō-moku*, or General Outline of the *Hon-zō*<sup>43</sup> in Japanese.

醫方大成論和語 *I-hō-tai-sei-ron-wa-go*, or Complete Discussion in Japanese on Medical Prescriptions.

臟腑經絡詳解 *Zō-fu-kei-raku-shō-kai* or, Minute Descriptions of the Internal Viscera and Blood-vessels.

百味主能諺解 *Hiyaku-mi-shu-nō-gen-kai*, Popular Explanations of the Qualities or Efficiency of Medicines.

病因指南 *Biyo-shi-nan*, or, Guide to Pathology.

古今養生論和解 *Kō-kon-yō-jō-ron-wa-kai*, or, Discussion on Ancient and Modern Hygiene, with Explanations in Japanese.

阿是要訣 *A-zu-yō-ketsu*, A work on the principles of cauterization.

醫療指南 *I-riō-shi-nan*, or, Guide to Medical Treatment.

The story is related in the *Mei-i-den* of Okamoto Ippō, that upon a certain occasion he twitted his brother Chikamatsu Nobumori, a novelist and dramatist of considerable ability, with producing works designed only to please the taste, and in themselves of little or no value. To this Nobumori replied, laughing, "True indeed, brother, and I had just come to about the same conclusion regarding yourself; for it seems to me that in writing these popular explanations of the medical classics, you are giving the public chaff for food; and what is worse, misleading the students who depend upon your writings for their medical knowledge; and so I fear that the results of your writings will prove the more

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42. See page 296.

43. See page 293.

318 disastrous of the two." It is stated that, fearing these remarks were too true, he wrote no more such books thereafter, and even threw away a half-finished treatise on the *So-mon*, upon which he was then engaged.

Mr. Kochi states<sup>44</sup> that during the periods called Meireki and Banji (A.D. 1655-1651), and in the reign of the Emperor Go-Sai-in, two physicians, Hayashi Ichinoshin and Ōba Tōan, taught the principle of medical treatment held in most ancient times, and as contained in the *So-mon*,<sup>45</sup> *Rei-sū*<sup>46</sup> and *Nan-kiyo*.<sup>47</sup> One of the leading physicians of the school of Ōba Tōan, and also one of his pupils, was Mioka Sampaku. Ibara Dōyetsu, Asai Shūhaku, Ogawa Sakuan, and Okamoto Ippō,<sup>48</sup> also belonged to the same school.

About this time controversy arose among certain schools as to the relations sustained by the five chief organs (五臟), viz the heart, lungs, spleen, liver, and kidneys, with the five elements (五行), and concerning the theory of the circulation in the internal organs.<sup>49</sup>

In the reign of the Emperor Rei-gen, a physician of great popularity, Nagoya Geni by name, having discovered certain errors in the teachings of the school of Ri-shu,<sup>50</sup>

44. 日本醫道沿革考 See p. 245.

45. 素問 page 296.

46. 靈樞, See page 296.

47. 難經, See page 296.

48. See above.

49. In the MS. before referred to (page 245). Mr. Kochi speaks of the 運氣五行 literally "circulating spirit fire elements" (i.e. those which give motion: metal, wood, water, fire and earth) but in a foot note in which he attributes the above views to Riu Gen-so of China, as set forth in the *Sen-mei-ron* (宣明論) *So-mon-gen-ri* (素問元氣 see page 304), he speaks of the 運氣六行 literally "circulating spirit six elements," and seems to refer to the theory of the six spirits (六氣) already mentioned (see page 295).

50. i.e. the schools of Ri-To-yen and Shu-Tan-kei. See page 304.

began to practice according to the febrile theory of the *Shō-kan-sho-ron*,<sup>51</sup> but finally adopted the views of Chiu-kei,<sup>52</sup> then known as those of the old school. Nagoya Geni who was a physician of Kiyoto and otherwise known as Tanshin, may well be styled an empiric; for it is said of him that he only treated symptoms, and entirely ignored the theory of the Active and Passive Essences, then so popular. As to treatment, it is stated that in severe colds he employed *bushi* (附子 aconitium Fischeri.) Reichenb.) to warm; in bed fevers, *keima* (桂麻 cinnamon 319 and hemp); for intermittent fevers,<sup>53</sup> *shaku-yaku* (芍藥 Paeonia albiflora); for *Shoku-shō* (食傷 gastritis catarrhalis acuta), and *ō-sha* (嘔瀉 emesis), *sho-shi-ko* (小柴胡 a bitterish sudorific resembling gentian Williams); and in internal diseases, when medicines seemed of no avail, he employed *san-jutsu* (參朮 ginseng and a kind of glutinous rice.)

Gotō Tatsu, Matsubara Keiho, a pupil of Nabika Riyō, and Yamawaki Shōtoku, were all prominent physicians who joined with Nagoya Geni in his attack upon the popular theories of that time, and who with him soon came to be considered the great medical authorities of the day.

The former of these, Gotō Tatsu, was the author of the theory known as the *jun-ki-setsu* (順氣說) or, of the circulation of the spirit; the impediment or interruption of which, it was thought, caused disease. He held that, from long years of peace and an increasing tendency to luxury and idleness, disease had seized upon many of the people, and that the treatment, to be effectual, should be prompt and severe. He was therefore an

51. See page 296.

52.

53. "Cold fever."

advocate of the employment of acupuncture, and bear's gall as a remedy to be used in emergencies. For dysmenorrhœa, determination of blood to any organ, or in impediment to the circulation of the blood, as well as in chronic diseases, he recommended bathing in hot springs with the object in view of dilating all the vessels and thus reduce congestion. For anaemia, good nourishment and warmth were relied upon.

He discouraged the use of medical stones or warming helps, as they were called, which had been in use since the time of the Sung Dynasty of China; and he taught that the *Hachi-jū-ichū-nan-kiyō*<sup>54</sup> (as it was originally written) should form the basis of practice, and not the views of later writers thereon. He also required his pupils to study the works of Chiū-kei,<sup>55</sup> author of the *Shō-kan-ron*,<sup>56</sup> a treatise on colds and fevers, and Katsukō, born during the reign of the Tsin dynasty (A.D. 265-322), who wrote eight volumes of a work entitled *Chiū-kō-bikin-ho*.

Other authorities whose teaching he followed were, according to Mr. Kaku, the *Sō-gen-hō*<sup>57</sup> or *Sho-biyō-gen-hō*,<sup>58</sup> a work containing general discussions on the causes and symptoms of various diseases; the *Sen-kin-hō*,<sup>59</sup> by Son shi baku,<sup>60</sup> born during the Sung dynasty in China (A.D. 620-907) and the *Gūwai-tai-hi-yō*,<sup>61</sup> by Ōju, born during the reign of the same dynasty.

Gotō Tatsu was the author of the *Bi-yō-in-ko*,<sup>62</sup> an

54. Containing solutions to eighty-one difficulties of the *Sō-mon*. See page 274.

55. See page 296.

56. 傷寒論 See page 304.

57. 巢元方 See page 278.

58. 諸病源候總論.

59. 千金方 See page 277.

60. 孫子邈

61. 外臺秘要

62. 病因考

examination into the cause of disease, in which the theory above mentioned, and known as *jun-ki-setsu*, is put forth, and also of the *Yū-tan-setsu*<sup>63</sup> and *Kiū-setsu*,<sup>64</sup> the latter works relating to the use of the *moxa*.

He adopted three different-sized spoons, which he employed in making up medicines, and which have ever since been the recognized standard among physicians.

The *Kō-yō-i-gen*,<sup>65</sup> or Words on Medicine in Leisure Hours, was written by a pupil of Gotō named Kagawa Shūtaku, who also wrote *Yaku-sen*,<sup>66</sup> a work on the selection of medicines.

This Kagawa was the first to make minute investigations into the therapeutic value of the waters of hot springs of different localities, and he gave it as his opinion that the springs of Shirosaki in Tajima are the most valuable for the treatment of diseases. He believed that the temperature of the waters of hot springs was a sure guide to their therapeutic value, as was also the appearance of a rash upon the body while bathing; holding, on the one hand, that the higher the temperature, the more valuable the water; and on the other, that only those waters which produced a rash were at all beneficial. This, it is stated, is set forth in a work by Kagawa entitled *Yaku-sen-zoku-hen*,<sup>67</sup> a supplement to his work *Yaku-sen*, above mentioned, on the selection of medicines.

Another pupil of Gotō Tatsu, or Konzan, as he was sometimes called, was Yamamura Shigetaka, a native of the province of Ise, and also known by the name of Yamamura Tsūgen. He was the first, it is said, to employ artificial mineral waters, made in imitation of

63. 熊胆説 64. 灸説 65. 行餘醫言 66. 藥選 67. 藥選續編

natural waters, in the treatment of disease. His formula, Mr. Kaku states, was as follows: "Salt (sea) water, 5 *to*,"<sup>68</sup> sulphur, 600 *sen*, and rice bran, 1 *to*. Put  
 321 the rice bran into a bag made of *m:ino*, a coarse linen cloth, and boil it in two *to* of sulphur. The bran having been boiled until it begins to have a reddish color, strain the water and add the sulphur to it. The patient should bathe in this water three times daily, adding salt water from time to time and renewing it in winter after ten days. In summer fresh salt water should be added after four or five days, and one-half of the original quantity of sulphur and rice bran mixed in. In case sea water cannot be obtained, 5 *sho*<sup>69</sup> of salt may be dissolved in the usual quantity of water." The same writer, in commenting upon the conclusions of Yamamura, says:

"According to recent experiments the therapeutic effect and chemical constituents of the hot springs of Shirozaki and Kusatsu, upon which the above formula is based, differ but little from what Yamamura believed them to be. The chief constituents of the Shirozaki springs are sodic sulphate, sulphuretted hydrogen, calcic chloride, sodic carbonate, and magnesian sulphate, and the water is excellent in all chronic diseases, diseases of the skin, paralytic affections, diseases of women, and wounds."

"The chief constituents of the waters of Kusatsu in Kōdzuke are ferric sulphate, aluminic sulphate, and free sulphuric acid. They have tonic properties and are useful in the treatment of chronic diseases of the skin, chronic syphilis, poverty of the blood, chronic abscess, gonorrhea, nervous diseases and rheumatism."

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68. The *to* equals 1097.52 cubic inches.

69. The *sho* is one-tenth part of a *to* and equals 109.752 cu. in.

About this time, the treatment of diseases by emetics was first brought prominently forward by a physician named Okamura Riyochiku, also known as Nanzan, a native of Yechizen, and a pupil of Yamawaki Shotoku of Kiyoto.

Ogino Gengai of Kanazawa was another skilful physician of these times, and was a warm supporter of the employment of emetics in disease. He was the author of a work on the emetic treatment, called the *To-hō-hen*.<sup>70</sup> He also wrote a work upon acupuncture, in the practice of which of he had become celebrated; the name of this work is the *Shi-raku-hen*.<sup>71</sup>

A work upon the same subject, and called *Ki-sai-roku*,<sup>322</sup> by Kakimoto Shingen, appeared about the same time.

Later, and in the latter part of the century, the emetic treatment had yet another ardent advocate in Yemi Sampaku, a native of Hiroshima, who advanced the theory that disease arose from stoppage of food in the stomach, and brought as proof the statement in the Buddhist books, that there were four hundred and four kinds of diseases arising from the food eaten, in the curing of which it was required that the patient should fast for four or five days. These views are contained in a work written by himself, and called *Tohō-shi-roku*.<sup>72</sup>

In the period of Hōreki (A.D. 1751–1763), and during the reign of the Emperor Momozono, still another school was founded, or rather an old school revived, by Yoshimasu Tamenori, also known as Tōdō, of Kiyōto, which school was called *Ichī-doku-ka*, or school of one poison: so named from the views held by its founder, who believed all diseases to be due to the penetration into the

system of a certain poison, the effects of which could only be counteracted by impressing the system with another poison equally powerful.

The theories of this school, which are said to have been derived from Hen Jaku and Chūkei<sup>73</sup> of China, and were held in antagonism to those received from medical writers of the Sung and later Dynasties, and led to the treatment, already mentioned, of first directing attention to the stomach and intestinal tract. The theory of the negative and positive essences and the five elements, the *In-yō-gō-giō* (陰陽五行) was still held by the Japanese of this time, and the method of treatment known as *on-ho* (warming and repairing) greatly relied on.

The following is the theory of Yoshimasu:

"All diseases are due to a poison, or are poison. We attack poison with poison, and when the poison has disappeared the body is healed.

"There is, however, loss of *gen-ki* (元氣), original energy or spirit. Then why should we say *ho* (補), or that we repair?"

He also held that life and death are under the decrees of Heaven, but that disease comes within the domain of human control.

- 323 Death from sickness, he called a fate not decreed by Heaven, while to die at the hands of an unskilled physician, he held was an unnatural death; believing with the sage Mencius, that if when the utmost means have been employed, death follow, it is but the decree of Heaven.

Yoshimasu Tamenori was the author of the *I-dan* (醫斷), or, Medical Decision, and numbered among his

73. See page.



pupils many who became noted physicians, such as Nakinishi Shinsai in Yamato, Mine Shōwō at Yedo, Murai Tōjū in Higo, Tsuru Genitsu in Hizen, Tanaka Genchiū in Harima, Yamabe Bumpaku in Nakatsu, and Momonoi in Mutsu.

Later, in the period of Anyei (1772-1780), another school arose, founded by Yoshimasu Nangai, son of Yoshimasu Tsunenori. It appears that Nangai, after reflecting upon the theoretic teachings of the school of his father, the theory of the one (specific) poison, as the cause of all diseases, came to the conclusion that it does not hold in all cases; and thereupon he formulated the proposition, that a vital spirit and the uninterrupted circulation of blood and water in the system, are essential to a perfect state of health; and that any alteration in the condition of this spirit, or of the circulation of these fluids, as, for instance, their retardation or acceleration, constitutes disease: and that, therefore, there are in the human system these three points of attack, against which the specific poison may be directed. He therefore divided those diseases described by Chiū-kei in the *Shō-kō-chi-hō*<sup>74</sup> under three heads, as results of alterations in the vital

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74. Mr. Kōchi states the theory of this school in the following words:—

“The human body is maintained by the unceasing circulation of spirit or air, blood and water. The origin of disease lies in any interruption or impediment of the circulation, which then assumes an abnormal condition. The poison is the same: but the causes of the poison are three. Thus, taking the symptoms of disease laid down by Chiūkei (仲景) as a foundation, he classified the various symptoms of disease, he discriminated between the agent and agency, ascertained the location of disease, discerned the rate of its progress and its condition, whether organic or functional; and attributed all diseases clearly to these three sources—the spirit or air, blood and water.”

spirit, or in circulation of blood or of water. From this doctrine the school became known as the school of the vital spirit, blood, and water.<sup>75</sup> It is said, however, that 324 this theory, in reality, differs but little from that held by the so-called new school of the day, with whom the circulation of mucus (or lymph), instead of water, held an important place.

Yoshimasu Nangai was the author of a work called *Ki-ketsu-sui-yaku-cho*,<sup>76</sup> on the therapeutic qualities of air (vital spirit), blood, and water. It is stated that the pupils of Nangai numbered over 3000, among whom were Nakagawa Shūtei in Yamato, Kaya Taian in Nagato, and Ogawa Yūsai at Yedo.

Contemporary with Yoshimasu Tamenori, there lived in Tokiyo, Mochidzuki Jō, also known by the name of Kunsan, and Sanyei Rokumon, who was the author of a work called *I-kuwan-gen-kō*,<sup>77</sup> containing numerous ancient prescriptions, and an attack upon the theory of the "five elements." His medical opinions may be classed as eclectic of the old schools. About this time, a system of treatment based upon the diagnosis of disease through an inspection of the abdomen, became quite popular. It is stated that although the anatomical teachings which gave rise to this system were derived from Chiūkei of China, its development is due to Japanese physicians, not a few of whom followed it in their practice. The method of diagnosis was first brought forward, Mr. Kaku states, by Taketa Teika early in the 17th century, and afterwards found a warm supporter in Seoka Chōkei. Seoka held, it is stated, that in the practice of medicine there are three divisions, namely: evidence, diagnosis, and treat-

ment. As to evidence or the symptomatology of disease, he taught that it was twofold—that which is derived from a general inspection of the body, and from the more minute inspection of the abdomen. The former method he held often led to mistake, but the latter he looked upon as infallible. It seems that this method depended principally upon a supposed anatomical arrangement of the viscera of the abdominal cavity, the notions of which were as yet inaccurate, and often false. The treatment was eclectic, and differed little from the methods of those schools already described.

The views of Seoka are contained in a work entitled *Shin-k'yoku-dzu-sestu*,<sup>77</sup> an illustrated treatise upon diagnosis, of which he was the author. The names of other works upon this subject mentioned by Mr. Kaku are as follows: *Fuku-shin-hi-ketsu*,<sup>78</sup> by Taga Antei; *Shin-fuku-hō*,<sup>79</sup> by Kitayama Dōchō; *Fukushin-sho*,<sup>80</sup> by Hori Nao-shige; *Fuku-shin-hi-den*,<sup>81</sup> by Takamura Riyōmu; *Fukushō-ki-ran*,<sup>82</sup> by Inaba Koku; *Fuku-shō-ki-ran-yoku*,<sup>83</sup> by Wakuta Tora.

In the last decade of the eighteenth century, there flourished the school of Taki Genkō. The founder of this school, regretting the decay into which his art had fallen, began the compilation of a new system of medicine based upon the more valuable prescriptions found in the Chinese medical works of writers from the times of the Han (B.C. 206 to A.D. 25) and T'ang (A.D. 620–907) Dynasties to those of the Ming (A.D. 1368–1644) and Ts'ing (present), as well as from various Japanese authors.

78. 診極圖説

81. 腹診書

84. 腹証奇覽異

79. 腹診秘訣

82. 腹診秘傳

80. 診腹法

83. 腹証奇覽

This work, Mr. Kōchi states, was completed by Genkan's son. Genkan was a descendant of Tamba Yasuyori,<sup>85</sup> and was the son of Taki Gentoku, and the grandson of Taki Genkō, the founder of a famous medical school at Yedo.

The following, relating to the establishment of this school, is taken from the "Outline History of Japanese Education," prepared by the Department of Education for the Philadelphia International Exhibition.

"A medical school was first founded on the Chinese system in the second year of Meiwa (A.D. 1765), by Taki Genkō, a physician of the Shōgun's Government.

"Genkō was a descendant of the family of Tamba; his forefathers were physicians in the service of the Imperial Court; one of them, however, was a physician of the Shōgun.

"Genkō distinguished himself greatly in his profession, and in the above-mentioned year<sup>86</sup> he at length asked for and obtained from the Government a piece of ground at Soto Kanda, in Yedo, where he founded a private school, in which the younger members of the families of government physicians of the several provinces and towns were able to study medical science. In the following year Genkō died, and was succeeded by his son Gentoku, who superintended the medical school. In the first year<sup>326</sup> of Anyei (A.D. 1772) this school was burnt down, and Gentoku, at his own expense, rebuilt it. In the second year of Anyei (A.D. 1773) all the physicians in the service of the Shōgun were ordered to subscribe a certain amount of money toward the expense of this school. In the sixth year of Temmei (A.D. 1786) the school was

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85. See page 281.

86. Mr. Kaku states that this school was established in the year 1756.

again rebuilt, and new regulations were made, by which the sons of government physicians and other students were allowed to live within the school, and carry on their studies during the term of one hundred days in the two seasons of every year. In the third year of Kuwansei (1791) a new system was established, and the school received some land-endowments and became a government medical institution.<sup>87</sup>

"The new system was formed under the direction of Anchō,<sup>88</sup> the son of Gentoku. He abolished the practice of admitting the physicians of the provinces and towns, and only admitted members of the families of the government physicians, limiting the age of those admitted to forty years and under. Besides which, he fixed days on which all the physicians of the Shōgun should meet and discuss matters relating to their profession. The office of school-director, however, was still held by Gentoku himself. On this occasion, also, all the officers of the school, such as supervisors, lecturers, compounders of medicines, etc., were appointed. When any patients sought advice, they were examined by all the physicians of the institution, and were supplied with medicines at the expense of the Government.

"Gentoku and Anchō, as a reward for having devoted themselves to the profession, and for having founded, rebuilt, and kept open this school at their own expense, received from the Government a certain sum of money. Since this the posterity of the Taki family have continued to be made directors of this school."

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87. It then received the name of I-gaku-kuwan, or the Medical Institute.

88. Also called Genkan.

It is said that the principles held by this school had been previously, in a measure, set forth by Mochidzuki San-yei, who, opposing the visceral theory, sought to reestablish the teachings of the more ancient school. Contemporary with Taki Genkan, and holding the same views, were Fukui Fūtei of Kiyoto, and Isawa Shintei of Yedo.

- 327 Considering the severity of the restrictions placed by the Government of the Shōgun upon intercourse between foreigners and Japanese in the sixteenth and seventeenth centuries, it is not surprising that the study of foreign languages, and especially that of Dutch, as well as the study of Western medicine, made but little progress in Japan during the century following the advent of Dutch subjects at Dejima, and during the period of their restricted communication with the people of this country. Indeed, it was not until towards the close of the second century after the event just mentioned, that the real and lasting foundation of a school of Western medicine and surgery was laid, when a few earnest men, whose names ever deserve to be remembered with feelings of admiration and gratitude by their countrymen, whom they have so greatly benefited, were led to undertake the task of giving to Japan a translation of a Dutch work on anatomy, the first work of its kind ever translated into Japanese. One of these, Sugita Issai, better known as Sugita Gempaku, a skilful physician, a learned scholar, and himself the principal actor, has given us, in the *Ran-gaku-koto-no-hajime*, an account of the circumstances which led to the undertaking of this work, the difficulties encountered in its prosecution, and its final success. It appears that towards the middle of the eighteenth century, Nishi Zensaburō, Yoshiwo Kozayemon, and another Dutch

interpreter, obtained permission from the Government to learn the Dutch characters, hitherto forbidden, with a view to learning to read and write Dutch. The Shōgun Yoshimune, having, soon after this, been presented with a Dutch book, ordered it to be translated, and assigned to one Awōki Bunzō, a learned scholar, and Noro Genjo, a court physician, the task of translating it. Awōki and Noro spent several years on this work, and in the study of Dutch, both in Yedo and at Nagasaki. While in Yedo, and soon after his return from Nagasaki, Awōki was applied to by a physician of considerable merit, then in the service of the Prince of Nakatsu (Okudaira), one Mayeno Riotaku, who was very desirous of learning Dutch, and whose enthusiasm pleased Awōki so much that he made him his pupil, and taught him all he himself knew. Later, Mayeno was sent by his master to Nagasaki, where he added to his knowledge both of Dutch and of Western surgery.

Among the friends of Mayeno Riotaku, was Sugita Gempaku, himself also in the service of the Prince of<sup>328</sup> Nakatsu. About the year 1767 Sugita made a copy of the diagrams contained in a work on surgery (Hastel's?), which he had contrived to borrow; and a few years later, in 1771, he became possessed, through the kindness of a friend at court, of two other books in Dutch, one of which was a work on anatomy (p. 229). In looking over this latter book, his attention was drawn to numerous discrepancies between it and what he had been taught was the anatomy of the human frame. Whereupon, to use his own words, he "was seized with a great desire to make practical observations, and to compare them with the diagrams already copied."

Opportunity offering shortly after in the privilege granted him to witness a dissection at the execution grounds of Kotsu ga hara (Plain of Bones), near Asakusa, Tokiyo, he joyfully availed himself of it, having first invited his friends Mayeno Riotsaku and Nakagawa Kiyōwan to accompany him.

The "subject" turned out to be the body of a female criminal, known as Awocha Baba (Old Mother Green-tea), who had paid the penalty of her crimes with her head, having been condemned to undergo decapitation. The dissection was conducted by an old executioner, who had had some previous experience in this kind of work, an occasional duty which was at that time performed exclusively by men of his class.

Of the dissection, Sugita says: "As the executioner pointed out the different viscera, etc., there being no names written upon these different parts of the human body (as in the tables), we were compelled to be content with what we were told. \* \* \* However, we compared it with the diagrams of the book (which Mayeno had brought with him) and found that there was no difference whatever, while what they had been taught in Chinese books as to the six divisions of the lungs, the three divisions of the left liver, and four of the right, as well as the general arrangement of these and other viscera, was found to be quite incorrect." Sugita further tells us, that Okada and Fujimoto, court physicians, had already witnessed some seven or eight dissections, but had been unable to account for the anatomical differences detected by themselves between the actual dissections and what they had always supposed to be the internal arrangement of these viscera, except upon the ground that the



anatomical structures of one race differed thus widely 329 from those of others.<sup>89</sup> Stimulated by a desire to understand more of anatomy, and filled with a sense of shame that men of his time knew so little of the structure of the human body which they professed to understand, Sugita, with his friends, determined to make a thorough study of Dutch, with the hope that they might be enabled to give to their countrymen a Japanese translation of this work on anatomy (*Tafel Anatomica* by John Adams Kurumanns), of which they had been so fortunate as to become possessed. As Sugita knew at this time but little more than the alphabet of the Dutch, and Mayeno's Dutch vocabulary embraced but a few hundred words, their progress was necessarily very slow and tedious.

Speaking of some of the difficulties they met with, Sugita says:<sup>90</sup>

“At that time, we did not know anything about such

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89. In the recent number of the *Kō-i-gep-pō*, a monthly journal devoted to medicine, and also in the *Tōkiyo I-ji-shin-shi*, or *Tōkiyo Medical News*, it is stated, in a historical sketch of anatomy in Japan, that, with the exception of the post-mortem examination made in the fifth century (see page 263), anatomical dissection of the human body was not practised until the sixteenth or seventeenth century. The first dissection mentioned in history was performed by a medical officer of the Prince of Nagato; but as the drawings made at the time were kept secret or suppressed, little is known of this work. Later, in the middle of the eighteenth century, Yamawaki Shōtoku obtained permission from the Government to make dissections, and soon after published a work known as the *Zōshi* (藏志) or description of the internal organs. Still later, in the first decade of the nineteenth century, the *Kai-so-dzu-fu* (解藏圖譜) on the anatomy of the inner organs, by Komori Tō-o, was published.

90. Mr. Mitsukuri, on the Early Study of Dutch in Japan. *Asiatic Soc. Tran.*, vol. v, part i, page 213.

auxiliary words as *de*, *het*, *als*, and *welke*, and therefore, though we might occasionally meet with words that we knew, we could not make any connected sense out of them; for instance, such a simple sentence as, 'the eye-brow in hair browng a little above the eye,' was all confusion; and we had to spend a long spring day, even till dark, thinking and thinking, as hard as we could over it. One day when we came to the nose, it was the thing that is *verheven*; we did not then have any dictionary, but in looking over the list of words which Riotaku had brought from Nagasaki, we found that it was said that the tree is *verheven* when a branch is cut  
 330 off, and also, that when a garden is swept and the dirt put together, it is *verheven*. As usual, we fell to thinking, but could not make it out. A bright thought came to me, that when the tree whose branch has been cut off, heals, the place is slightly elevated, and again, that the dirt accumulated will of course be elevated. Then the word must mean 'elevated.' All agreed that this was quite reasonable, and decided that the word should be translated 'elevated.' The feeling of joy which I experienced then can not be told. I felt as if I had obtained a whole castle full of precious stones." Gradually, however, with wonderful perseverance, by meeting six or seven times every month, they became better acquainted with the language; and after a while were able to translate as many as ten lines in a day.

The whole work took four years in translation, during which time it was re-written eleven times; and was finally published by Sugita under the title of *Kai-tai-shin-sho*, "New work on Anatomy."<sup>91</sup> He had entertained doubts

as to the safety of publishing this work at the time, as but a little before a book had been suppressed only on the ground that it contained the Dutch alphabet.

The work, however, was well received, and passed, Dr. Sugita Gentan states, through two editions and a revision. It consisted at first of three volumes, but having been revised some years later by Udagawa Genshin, it was enlarged to thirteen volumes, and was called *I-han-tei-kō*<sup>92</sup> (an outline of the principles of medicine). Sugita, together with his friends Mayeno and the others who assisted in the work, received many honors, and a great number of students flocked to them from all parts of the country.

The following are the titles of other works written by Sugita: *Chō-i-shin-shō*<sup>93</sup> 腸醫新書, New Book on the Treatment of Sores; *Kei-yei-ya-wa*, 形影夜話, Night Talks with a Shadow; *Yō-jō-shichi-fuka* 養生七不可, Seven Hindrances to Hygiene; *Kō-ken-gusa* 後見草, The Guardian Grasses; *Tama-mi-so* 玉味噌, Precious *miso*,<sup>94</sup> and *Ki-tetsu-doku-go* 耆耄獨語, Soliloquy of an Octogenarian.

Among the works by Sugita above mentioned, there 331 is one, the *Kei-yei-ya-wa*, in which the author has given an account of his early medical impressions, and also his views upon the state of medicine at about the time he published his work upon anatomy, and shows that it

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92. 醫範提綱

93. The second and third parts of this work were written, or rather translated from the Dutch (?), by Osawa Gentaku.

94. *Miso* is a kind of fermented sauce made from soy beans (*Glycine hispida*), very generally used in soups, etc., and considered a necessary article of food. The reference is probably to the character of the contents of the work.

was by no mere chance that he became a benefactor to his people, but by determined purpose. He has recorded his thoughts in the form of a dialogue between himself and the "Shadow Priest," as he calls his suppositious interlocutor. He says:—

"One night I had a talk with the 'Shadow Priest;' he said:

" 'Tell me now, since medicine has been the profession of your family for ages, what is the true secret of medical learning?'

"To this I made reply: 'Medicine has been ranked by some with the lowest of the arts; yet it is entitled to far higher estimation; for has it not been said, that he who cannot become a good minister of state, should at least become a good physician? showing that the sages did not regard our profession as useless to the people or the state. If we look about us, we find in the common arts many who are most skilful, while among those who follow the profession of medicine there are but few such. If search be made for the reason, it is this: that we who look from the outside, into the inner unknown, to discern, if it be possible, the conditions there existing, and to determine what means shall be taken to restore the body to the normal state of health, meet with many difficulties; while those who follow the other arts have but to do with things which they can work out by the thoughts of their minds. Yet, even such skill is only gained by long study. Horses and cows have been familiar to us all from our earliest childhood; yet how few there are who can draw, even passably well, pictures of these animals. The same principle holds good in medicine. Some one asked of Shō-gi-hōshi what he con-

sidered to be the secret of success in the art of composing poetry to which he replied: Like it; simply, like it. And so the proverb runs—to love an art, is to become skilful in it. Hence it is that the man who has natural talent, and a love for his profession, is sure to become proficient in it. He who has learned, to the extent of his ability, and in turn dispenses his knowledge to the world, is worthy of great honor. Talent is the gift of heaven; but if we have it not, we cannot help it.'

"The Priest then said: 'There is much truth in your 332 words. Have you not more to say?' and I continued:

"'It seems to me, that, not only in drawing and poetry, but in all other arts, he who loves his art is a true artist, and is sure to become successful. Among the personal acquaintances of my younger days, there was a man named Tomioka Moriyemon, who was short-sighted from his birth, and could not see distinctly even the mouth of a tea-kettle; for, it is said of him, that once upon a time, when he attempted to pour some hot water from the kettle into a cup, he received a most severe scald from the hot liquid, which, missing the cup ran down over his thigh; yet this man, at gun-practice, with unerring aim, never failed to hit the mark, although it were a hundred feet away. In his youth, it is said, he could count the birds swimming about far out in the lake, and that in this he never made a mistake.

"'Yamada Hansuke, who in youth was a skilful rider, became a cripple in old age, and could hardly walk at all: so that, when he went to the palace of his prince, he was permitted to ride. He was so helpless upon his feet that he had to be lifted by a servant to his horse's back; but when once mounted, no horse in the empire could unseat him.

“ ‘Kuboshima Shuntetsu, who practiced the art of acupuncture, could not cut toasted *tō-fu*<sup>95</sup> with his chop-sticks after he was attacked with paralysis; yet, whenever he took his needles in hand, his skill returned to him, as in his younger days.

“ ‘Udagawa Heibe, who was a most skilful tailor, and who could cut out clothes without any pattern, when he became old, and his eyesight failed, would add two-tenths to every inch of the cloth, as he measured it with his eye, saying that the eyes of an old man see things this much smaller.

“ ‘These were all my personal acquaintances, and were true artists, for they loved the arts they followed.

“ ‘I have heard it said of Arai Hakuseki, who was a great scholar, that he used, each night, to write down the substance of the conversations held with his friends during the day: and, that he might refresh his memory, he often read these notes when alone.

- 333 “ ‘It is related of Soroi, who was also a scholar of extraordinary attainments, that on one occasion he and his cousin, an officer of Takamatsu, listened to a long and uninteresting discourse upon military tactics, during which the lecturer (who was himself only a tactician, with little practical knowledge) was guilty of numerous incongruities, and made grievous mistakes. Upon their return home, and while waiting for supper, Sorai surprised his cousin greatly by writing out and criticising all the mistakes of the lecturer. Such was the assiduity with which these two remarkable men followed the pursuit of knowledge, having made illustrious names for themselves, as founders of great schools of learning.’

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95. A kind of bean curd. \*

“Priest: ‘Hakuseki and Sorai were men of extraordinary talent. How can others, not possessed of such talent, attain to the point these men reached? Skill, in medical treatment especially, is well known to be difficult of attainment. On what foundation, then, can we build, who would become skilful in medical matters?’

“Sugita: ‘Many years ago, Nakamura Hikozō, a scholar of Takamatsu, taught his pupils to commit everything to memory (literally, until it pierces the heart). What we call intelligence and wisdom, is nothing but the remembering well that which has been seen or heard, and the making practical use of it when opportunity offers. In a word, he who applies himself diligently to anything, and whose mind is ever awake to catch every suggestion, is intelligent. This is the first great point in the study of medicine.

“‘From most ancient times, and even to the present day, those who have founded schools of medicine were men of extensive learning and great talent. The theories, however, upon which they built were not well founded; consequently they failed to see the truth correctly, for there are few things founded upon real experiment, and facts well ascertained, in the standard works of medical writers, from the ancient time of the *So-nan* (p. 263), known to those of more recent date.

“‘The art of medicine has for its object the healing of diseases of the body. It is, therefore, necessary, in the first place, that we should know the structure, form, and functions of the different portions of the body, internal as well as external. Hitherto, this knowledge has not been acquired. Some held that the gall bladder is on the left side; others thought it to be on the right.

334 This ignorance is carried so far, that we are told that food and drink go first to the gall and then to the spleen, and from thence pass to the stomach; and there have been none to investigate these matters. Katsu, of the Yuen Dynasty, for instance, said that the point of conjunction is on the lower part of each vertebra, while Cho of the Ming Dynasty held that it was on the upper, making a difference of about one inch in the matter of the backbone. None, however, have felt any wonder at such a discrepancy, and each one has followed whatever opinion he chose. If there were any who loved the art of medicine truly, we should not expect matters to have remained so long in such a state.

“‘Anatomically, men are nearly alike; and is it not plain, that, if there be such differences of opinion as to the structure of the body, medical treatment cannot but be empirical?

“‘In this country Gotō Kōsan (p. 320) broke away from these absurdities, and putting forward a theory of his own, repudiated the false views of the *Nai-ki-yō* (p. 298). He saw that the generally accepted theory of the various systems, and their relations, were not only fallacious, but utterly useless. Truly, this was a bold and brave step to take, such as we have not seen in the world for a thousand years. His pupil Kagawa followed after him, and was the founder of a school of medical opinion.

“‘Later, Yamawaki appeared, who produced a work upon the observation of the phenomena of the internal organs, entitled *Zō-shi*. Although he did not bring forward any accurate facts, he nevertheless showed what was the true method of inquiry.



“ ‘Yoshimasu (p. 324), however, was the greatest man of recent times. He studied only one work closely, the *Shōkan-ron* (p. 319), as there was no other which could be made the foundation of medical treatment. Even in this book he found very few accurate facts, and many errors, and so he selected only such as he thought best. He finally came to the conclusion, that the phenomena of the pulse are of little value as a means of diagnosis, which, he held, could best be made through an inspection of the abdomen. He came to this conclusion necessarily, as a result of his investigations; but at this time could go no further.

“ ‘My own family have rendered medical service to our prince for many years, so that I could not escape from this profession even if I chose. Moreover, it is not an art which I dislike, so I have studied the medical books of the Chinese, as well as our own, since my youth. I did not at first, however, from my natural inaptitude, understand the meaning; and thinking that others did understand, for many years I felt much ashamed of many ignorances. When I was about twenty-two years of age, my friend Kosugi Genteki returned from Kiyōto, where he had been pursuing his studies, and told me of the dissection of the human body made by Yamawaki Tōyō (p. 329) who had made the discovery that there were many errors in the anatomical views current in the world during so many hundreds of years. I also heard of Matabara and Yoshimasu, who were then leading in the revival of our ancient methods of medical treatment. I was filled with great admiration for such men, and having heard that within the domain of medicine, as on the battle-field, great heroes had arisen in the West, and desiring not

to be a follower at their tails merely, I made up my mind that having happily been born in a family the profession of which was the healing of sores, I would in earnest make that my life work.

“Although I had determined what I would do, I could find no way of accomplishing my purpose; nor was there any help at hand, so that for some time I labored and strove in vain. Having read by chance the work by Sorai called *Gin-roku-gwai-sho* (鈴録外書), wherein it is stated that the true tactics of war are not such as taught by the so-called tacticians nowadays, I became convinced that such was also the case in medicine, and that real progress cannot be made unless our system of medicine be thoroughly renovated and reformed. After this, I saw that the true principles of medical art were those brought to us from Holland, the country far away in the West: for in that country it is a recognized principle, that true medical art is founded upon an accurate knowledge of the normal conditions of the various portions of the body, both internal and external. If we are not accurate in our knowledge of these, our attempts at treatment are made in the dark. Let me illustrate. When the physician of to-day goes to the house of the sick, and, in the first place, feels the pulse of the patient, he feels, it is true, the rising and falling pulsations under his fingers; he counts their number; but he knows only that it is called the pulse, and no more. How foolish! Moreover, various  
335 names are given to the same pulsation, which, in truth, is caused by the circulation of the blood in the blood-vessels. Such distinctions, therefore, are useless. Physicians waste their energy in studying such things, and after all, seem only to know that when there is heat or fever the pulse becomes quicker.

“One who understands, however, the physiology of the internal organs, can readily explain this phenomenon of the pulse. Now what are called the pulses, are in reality blood-vessels, through which the blood is circulating. The origin of these vessels is in the heart, with which they are connected by means of a great tube, and through which the blood is continually shooting out and circulating in all the parts of the body. If we desire to know the condition of this circulating fluid, nothing is practically better than to feel the pulse and observe its movement. The opinion of Yoshimasu, that the pulse is of little use in diagnosis, was indeed too far advanced beyond the real truth, and was undoubtedly erroneous; but as there were no books at this time which gave a true explanation of it, his was indeed a heroic decision, and that of a great man who had no other reasonable course left for him to take. I feel sure, had he then heard of such medical truths as are found in the books of Holland, that he would have rejoiced greatly; but, alas, he has gone to another life.’ ”

Before closing this brief account of the labors of Sugita and his co-laborers, the writer is constrained to give expression to the opinion gained by reading over the writings of this author, and by what he has since heard from friends, that Sugita, in his sincere desire to be a benefit to his countrymen, had also come to entertain a deep respect for the truths of the gospel of the “forbidden sect,” if he had not actually become a believer in them.

It is true that in the opening pages of this book, to which reference has just been made, he says, in speaking of the Portuguese, that “they came to make trade in

public, but wished some other things in private. And again, "The erroneous religion we do not know at all"; but in the next sentence he says: "Nor have we any argument against it." It was his custom, when meeting with words which it was impossible to understand, in the translation of his work on anatomy, to mark opposite each a *kutsuwa* (cross in a circle); and it is related of him, that he always accompanied the sign with a prayer to God that the meaning might be shown him. Another curious, although not necessarily significant coincidence, occurs in 373 the names adopted by some of his pupils, as, Udagawa *Yoan* (John) and Tsuboi *Shindo* (believing doctrine).

The descendants of Sugita, even to the present generation, have followed in the footsteps of their worthy ancestor, and have by their benevolent labors done much toward bringing about the great change which has taken place in this country within the last century, and the establishment in this Eastern Empire of a new civilization, one of the forerunners of which was the introduction of Western medicine.<sup>96</sup>

In the latter part of the eighteenth century, and the earlier part of the nineteenth, there lived at Yedo one Ōtsuki Moshitsu of Sendai, a pupil of Sugita and Mayeno, who rendered great service by translating numerous works from Dutch into Japanese. He gave to Japan her first grammar of the Dutch language in Japanese. Among other works, he published a revised edition of Sugita's

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96. The frontispiece to this paper, representing Sugita Gempaku (or, according to the Western custom of placing the personal name first, Gempaku Sugita), has been drawn from a statuette in wood, made during the lifetime of Sugita, and now in the possession of his descendant, Dr. Sugita Gentan of Tōkiyō.

Anatomy. He died in 1827. Among his pupils were Udagawa Gensai of Tsuyama, Inamura Sampaku of Tottori, Yamamura Saisuke, Yasuoka Genshin of Ise, and Hashimoto Sōkichi of Ōsaka. Of these, several became famous, among whom was Yasuoka Genshin, who published a work on physiology, and whose son, Yoan, published the first book in Japanese on chemistry, the *Sei-mik-kai-sō* (舍密開宗). Yoan also published an anatomy called the *I-han-tei-kō* (醫範提綱).

In 1848 the Shōgun decreed that Western medicine should not be practised in Japan, and the use of foreign medicines was likewise forbidden, for the reason that there existed great physical differences between foreigners and Japanese, and, therefore, the remedies which had proved efficacious in the treatment of the diseases of foreigners, would not necessarily cure the diseases of the Japanese, but on the contrary might prove an injury. The practice of Western surgery, however, was not prohibited.

Excepting Kasper, at Yedo, in 1644, the first European after the closing of the country to foreigners who, with the consent of Government, taught Western medicine, 338 was Dr. von Siebold, who in about the year 1824 gave instruction to a few pupils at Nagasaki. He also exerted his influence to induce the Government to introduce the practice of the art of vaccination, discovered by Edward Jenner, and made public by him in 1798.<sup>97</sup>

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97. The following extract from a brief sketch of the life of Baron von Siebold appeared in the *Japan Weekly Mail* of December 27th, 1879, for a copy of which the writer is indebted to Mr. Henry von Siebold, Secretary to the Austro-Hungarian Legation :—

“Dr. Siebold first went to Yedo, the capital of the Empire, and residence of the Shōgun, a town said to contain a million and a half in-

339 The practice of vaccination, it is stated, was introduced into Japan by Dr. Mohnike, a Dutch physician at Nagasaki, in 1849, and a few years later by Japanese physicians at Yedo. It seems, however, that the art was known and practised some years previous to this time in Yezo, where it is said to have been introduced from Russia by Nakagawa Goroji, a fisherman of Matsumai; for the following account of which introduction the writer is indebted to Mr. K. Uchimura, an officer of the Department of Agriculture and Commerce, and formerly connected with the Agricultural College at Sapporo Yezo:—

habitants in the year 1826. Here he had the fortune and honour of being received by His Highness the Shogun, *i.e.* of expressing devotion in a crawling posture. The embassy soon returned to Nagasaki; but Siebold received permission to remain longer in Yedo, on condition that he would instruct Japanese physicians further in medical and surgical knowledge. That he used this permission for a further stay in the capital as much as possible for the purpose of increasing his collections and information, can easily be understood; but still he felt bound in gratitude to exert himself in spreading knowledge among the Japanese who surrounded him. His labours in this direction were certainly beneficial to Japan; for it must be said to the credit of the people, that, if they have certain failings, and especially a love of gain, in common with other Asiatic nations, yet they honourably distinguish themselves from the others by their thirst for knowledge, and their capacity for acquiring it.

“From Yedo, well assisted by his pupils, he was enabled to penetrate the innermost secrets of Japan; and the Japanese, forgetting their patriotic duty to conceal all from the foreigner, betrayed matters which up to that time were unknown to the student. Even treasures from sacred temples devoted to the Buddhist or Shintō faiths were given to him for his good words or his gold. All kinds of drawings and maps came into his possession. One of the highest persons in the empire, the chief court spy, made him a present secretly of the chief map of the country, which voluntary gift Siebold naturally felt himself obliged to acknowledge with hard ducats. He accomplished all this, notwithstanding the isolation of the Japanese, and the strict laws of the land. But to the student himself the materials which he had collected

There was a fisherman of Matsumai (Yezo), named Nakagawa Goroji, who while out fishing one day, was overtaken by a storm, and was driven to the coast of Siberia. The Russian Government at that time was commencing to introduce vaccination from England among the people.

Nakagawa lost no opportunity in learning the art himself, and when 340 he returned home, which was in 1824 (25 years earlier than the first introduction of vaccination at Nagasaki by the Dutch), he immediately put his knowledge into practice by vaccinating some girls. A few years after, an epidemic raged through the land, and many escaped from the attack through this operation.

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seemed already so much, that if they were to be of any scientific use he must make up his mind to put them in order, and therefore he concluded, surprised and overjoyed at the unexpectedly brilliant results of his studies, to proceed to Europe, whither he had already sent the greater portion of his treasures. But in this zenith of his fortune, there came a serious danger suddenly, like a thunderbolt in a clear sky. One of those whom he had bribed, but who seems to have received too little, informed the Shōgun of the story of the map which the chief court spy had sold to Siebold. Both were thrown into prison and were tried as traitors to the country. Sentence was given that, instead of the public punishment of their offence, they were both to commit *harakiri*. Whether the court spy, in devotion to his master, and from loyalty to the law of the land, actually did so, or not, is a secret; but it is certain that for a considerable time it was believed that Siebold would be forced to commit suicide, or undergo the full penalty of the law. Meantime his friends and countrymen exerted themselves in his favour, and at the end of fourteen months detention he was released and sentenced to perpetual banishment from the empire. On the 1st January, 1830, Siebold left Nagasaki, where he had been incarcerated.

“After a stay of six years, full of difficulties and dangers, but joyful in a wide range of knowledge, and above all rich in information and experience, bringing to his native land a hitherto unknown, unexplored, kingdom of natural and art treasures, Siebold arrived in Holland in July, 1830.

“During his stay in Japan the great work: ‘De historie naturalis in Japonica statu 1824,’ was completed, as also ‘Eptome linguæ japonicæ,’ in Batavia 1824. After his return appeared ‘Catalogus librorum japonicorum,’ and ‘Isagoge in bibliothecam japonicam;’ and in 1833 ‘Biblio-

His reputation went through the vicinity, and attracted the attention of Dr. Sakurai Shōzen, who had just returned to his home in Matsumai, after studying in Kiyoto. Sakurai at once learned the art from the fisherman, and practised it upon his relatives with good results. Nakagawa was promoted to the Samurai class, and died with the honor and respect of all around him, at the advanced age of more than 70. After Nakagawa's death, Sakurai made many inoculations, and also taught others the art. There are some still living in Matsumai who are 60 or 70 years old, on whose arms are to be found the scars of vaccination, and who tell us of the work due to the fisherman Nakagawa.

Thus it will be seen that the first introducers of vaccination were not great doctors like Drs. Kuwata, Hirose and others: neither was Nagasaki the place which first received its blessings; but away in the northern extremity of the country, in the obscure town of Matsumai, by a poor fisherman, the sole preventative of one of the greatest epidemics which has destroyed so many of the children of men, found its way to our Empire.

As to the introduction of the practice of vaccination at Tōkiyō, the following has also been kindly furnished the writer by Mr. Uchimura:—

The introduction of vaccination into Tōkiyō met with much opposition, on account of great prejudices on the part of doctors of the old school. Indeed, I know of a case of a very skilful physician, (of the Chinese school), who persisted in his belief until his death, which occurred but a few years ago. He had a grandson, whom he loved most dearly. His relatives and friends all advised him to get this boy vaccinated, but his prejudice was so great as to cause him to hesitate in the

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theca japonica' in six volumes in Leyden. He had presented the greater part of his collections to the museum at Leyden, where he arranged them himself, thus making this one of the most valuable and interesting of existing museums. In 1832, appeared at Leyden a magnificent edition of the 'Fauna Japonica,' in completing which work Siebold received valuable assistance from the zoologists Temmink, Schlegel and Hann. In the publication of the 'Flora Japonica' he was also indebted to the learned botanist Zuccarini, of Munich. He had done good service by introducing the tea plant from Japan into Java; and also enriched our gardens by bringing home many hundreds of new shrubs, and ornamental as well as useful plants."



acceptance of this advice, till, alas, the little fellow was carried away by the epidemic. This great trial was not, however, sufficient to remove from him his ignorance about the matter, even until the time of his death. Such was the firmly established prejudice against vaccination among the physicians of his class. If I remember correctly, the first man who dared to introduce vaccination into the City of Tōkiyō was the prince of Sakura. He was a man of broad intellect, and impressed beyond all other princes with the superiority of European learning over our own. He sent some of his *kerai* to Nagasaki to study the "new medicines," and early became convinced of the necessity of introducing vaccination to prevent small-pox from carrying its devastations among so many of our countrymen. To convince his followers of the efficacy of the inoculation, he compelled one of his maids to be vaccinated; and indeed, the experiment succeeded so well as to set at rest all anxiety concerning her during the epidemic. He then tried it on several others, his near relatives, and children of his 341 own followers, who were compelled to be inoculated by the "dangerous poison," as they thought it, and sometimes the "master's whip" was necessary to force them to submit to the experiment. Singularly enough, I myself was under the motherly care of the above mentioned lady for about a year, and I heard the story from her own lips. Some of the history of vaccination since that period will be found, I think, in the report of the Tōkiyō University for the 10th year of Meiji.<sup>98</sup>

Following Siebold at Nagasaki, and first to organize a foreign medical school under the auspices of the Toku-

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98. The writer is indebted to Dr. J. C. Berry of Okayama for the following statement, obtained from a Japanese source, and relative to the introduction of the art of vaccination at Nagasaki and Kiyōto.

"In the Spring of 1849, the Dutch physician Mohnike brought to Nagasaki vaccine virus from Manila(?) '(from the island of Luzon).' Before this, the physician of the Prince of Yechizen, Kasahara Dōsaku, had heard of the advantages of vaccination and had spoken of the same to his Prince, who in turn, had pressed it upon the notice of the Government.

"The first person vaccinated was the child of the interpreter Yezawa of Nagasaki. The scab was sent to a Kiyōto physician, Hino Tōzai by name, who vaccinated his grand-child. From this child the virus was again sent back to Kasahara the Yechizen physician, from which time the operation became generally observed."

gawa Government, was Pompe van Meerdervoort, who in 1857 was invited to undertake the direction of the school so founded<sup>99</sup> Shortly afterwards, the first foreign hospital was established, and Dr. Pompe van Meerdervoort became<sup>342</sup> the attending physician, being assisted by Matsumoto

99. The Journal of the North-China Branch of the Royal Asiatic Society, May 1859, No. II, for a copy of which the writer is indebted to Mr. J. C. Hall of H. B. M.'s Legation, contains an interesting account by Dr. Pompe van Meerdervoort of the opening of the Medical School at Nagasaki; from which account the following extracts have been made:—

“The first public instruction, in medical and surgical sciences given by any European in Japan, was my inaugural address, delivered on the 15th of November, 1857. The nature and state of the natural sciences, and their influence on civilization, were described in general, and then their particular application to medicine and surgery. In doing this, I explained to my new scholars the object of my mission, the importance of what was to be done, the great extent of the natural sciences, and the relations to each other in which all these branches stand, so that each branch forms a link of the whole chain of nature; and with a desire to excite them onward in their new course, I pointed out the way in which, by indefatigable application and persevering study, all the great difficulties they might have to meet could be overcome; also I gave them the assurance that I would do all in my power to aid them in their labors and to facilitate their progress in learning.

“At the close of this address, the senior student, or rather the one highest in rank among them, in behalf of himself and the others thanked me, in a few hearty words, for the kindness shown in entering on this mission, and in now commencing my new task as their instructor, assuring me that they had long felt the want of greater facilities and aids in scientific pursuits, which hitherto had been much retarded by their old institutions and system of government.

“The Japanese have little knowledge of anatomy; and as no one of my pupils had the least idea of the science, I began by teaching them general and descriptive anatomy, so far as it was necessary for the good understanding of the different parts of the science. Three times a week I gave a half-hour's lecture; but in practical demonstrations I have found very great difficulty, because the use of dead subjects is not customary among this people; at least not in the presence or under the direction of a

Riyōjun of Yedo. From this school, Itō Gempaku, afterwards called Hōsei, and Hayashi Genkai, afterwards called Ki, the two most proficient scholars, were sent to Holland for further education.

These were the first students sent to Europe for medical education. The former was the adopted son of Itō Gempaku, and the latter the son of Hayashi Dōkai, both prominent physicians, of Yedo.

The following named Dutch physicians, after Dr. Pompe van Meerdevoort, were, at different times, in charge of 343 the school at Nagasaki:<sup>100</sup>—Drs. Bauduin, C. G. van Mansfeld, van Leuwen van Duivenboden, Fock and Beukema. Dr. E. Schmidt, of the American Episcopal Church, who arrived in 1860, the year following Dr. Hepburn's arrival at Yokohama, was the first medical

foreigner; and the officers of government fear to give their consent to it, as it conflicts with the moral and religious institutions of the Japanese people. I have spoken much about this matter and sent a memorial to the government at Yedo; which document was given to the Imperial council by Mr. Donker Curtius during his visit to the Court of Yedo a few months ago. In that memorial I dwelt extensively on this point, and acquainted them with the necessity of practical demonstration on dead bodies; but the only result I have reached is a promise that I should dissect the first condemned and executed criminal; but I think that since the time I received this promise several executions have taken place, and still I live on promises. My instruction has been given by demonstrations on engravings; but every anatomist will coincide with me in saying that this is a very unsatisfactory manner to teach anatomy.

"The science of Physiology, was totally new to the Japanese, and most of them did not know it even by name. I followed in my lessons the beautiful physiological work of Professor Donders and Dr. Bauduin; but was obliged to pass over several complicated parts, especially about physiological chemistry."

100. Hoffman. *Transactions of the German Asiatic Society*, part i, 1883.

missionary in Nagasaki after that port was opened to foreigners as one of the treaty ports. He at once opened a dispensary, but remained only about eighteen months, having been compelled to return home on account of ill health.<sup>101</sup>

In 1853, Commodore Perry with his fleet made his appearance in Japanese waters. In the following year, the treaty with the United States was concluded, and soon afterwards other great powers entered into treaty relations with Japan. Previous to this, and for a long period, the Dutch physicians had been the only foreign teachers of Western medicine in this country, and they were, with the exception of the occasion of their short annual visit to Yedo, only allowed to teach at Nagasaki.

From the period of Tempo (1830-1843) the most prominent Japanese physicians of Yedo were Itō Genboku, Totsuka Teikwai, Ōtsuki Shunsai, Hayashi Tōkai and Takenouchi Gendō. In 1858 these physicians founded a society with the object of establishing an institution for vaccination, which proved a success, and out of which grew the present Medical Department of the University of Tōkiyō.<sup>1</sup> As the establishment of this Institution for vaccination exercised no small influence in breaking down the prejudice against the medical methods of the West, and in establishing the practice of the same in this country, a brief historical sketch of the foundation and

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101. The writer is indebted for information respecting early medical missionary work in Japan to Dr. Verbeck's interesting paper upon the History of Missions, read before the Osaka Missionary Conference held in 1883.

1. Calendar of the Medical Department of the University 1880-1.

subsequent development into the present Medical Department of the University, is perhaps not here out of place. Being desirous of extending the practice of Western medicine, Itō, Totsuka and Takenouchi, with 77 others, formed themselves into a society for the purpose of founding an institution for vaccination, collected some 580 yen, and having obtained permission of the Shōgun's 344 Government, established a place of meeting at Otamaya Ike, Kanda. Kawaji Sayemon-no-jō, the Kanjō Bugiyō, becoming interested in the scheme, and in order to assist in carrying out the project, gave to the society a piece of his own land, whereon a "Hall of Vaccination," as it was called, was erected; but no instruction was as yet given. Very soon after, however, the building was destroyed by fire and, a new site having been obtained, the Institution was removed to another place. (At about the same time, the Shōgun Iyesada, having been taken seriously ill, sent for Itō, Totsuka and Takenouchi, and appointed them court physicians). In the following year (1859) a new building was erected at Shitaya, Idzumi-bashi-dōri, whither the establishment was removed. In 1860 the Shōgun's government contributed a sum of money towards meeting the expenses of the institution, which was now called *Shu-tō-jō*, (vaccination place). In the year following the government assumed the whole expense, and remodelled the *Shu-tō-jō* into a medical school, and gave it the name of *Sei-yō-i-gaku-sho*, or, Institute of Western Medicine. Ōtsuki Shunsai, a physician of one of the Tōkugawa *hata-moto*, was appointed superintendent (Tōdori, the first appointment of a physician of the Western School of medicine to this important post,) and Tsuboi Bōshiu and Shimamura Teiho, professors

(Kiyō-ju). Dormitories were built, students allowed to enter, and one or two branches of medicine were taught. Besides these, a few were selected from among the members of the society, who also gave lectures at this place in chemistry, anatomy, vaccination, etc. In the same year Itō Gempaku became Director-general; and in the following year (1862) Ogata Kiyōan, a court physician, was called from Ōsaka to assume the duties of the post of superintendent, made vacant by the death of Ōtsuki, while Ikeda Tachin, also a court physician, was made assistant.

The post of Superintendent of the Sei-yō-I-gakko having, by the death of Ogata, again become vacant, Matsumoto was selected to fill the office. In 1863, the name of the school was again changed, the word "Western" being omitted.

At the time of the Restoration in 1867, the hospital was closed for a short period, but was re-opened by Imperial command, and together with the school, placed under the charge of the Army Department. A new, but temporary, military hospital was also established at  
345 Yokohama at about the same time, to serve as a receiving hospital for wounded soldiers from the north-east, and Dr. Willis was appointed surgeon.

In September of the same year, this hospital was removed to the former Yashiki of the Daimiyō of Tōdō, at Shitaya, in Tōkiyō, and was named the *Tai-biyō-in*, or Great Hospital, and to which the medical college was united.

The first Director of the Hospital was Mayeda Shinsuke, who was soon after succeeded by Ogata Ippin; the vice-Director was Ishigami Riyōsaku. At this time,

the Hospital and Medical College were under the control of the Army Department, but soon after were placed under the superintendence of the Municipal Government of Tōkiyō. In the early part of 1869, the Medical School and Hospital were permanently united under the title of the "Medical School and Hospital," and in the month of May, of the same year, the management of this hospital and college was transferred to the University, which was then formally known as the Kai-sei Gakko, and which now became the Dai Gakko, and a little later, Dai Gaku. The name of the hospital and medical school was again changed to Dai Gaku Tō Kō, or Eastern College of the Dai Gaku or University.

The affairs of the College and Hospital were entrusted to the care of Iwasa Jun, and Sagara Chian, both *Gen hanyū* of the University. In 1870, a memorial was presented by the college authorities to the Government, setting forth the advantages to be derived from the instruction and practical assistance of foreign physicians and surgeons, who, it was petitioned, might be invited from Germany; and further, that unclaimed bodies of dead criminals might be given to them for dissection.

Both of these petitions were granted, and in the same year twelve medical students were sent abroad to be educated in Germany. In the following year, Dr. Müller, a Prussian chief staff-surgeon, and Dr. Hoffmann, a Prussian fleet-surgeon, became, at the invitation of the Government, professors in the College. The course of study was then rearranged, and divided into two, the preparatory, and the general course. Among these in the first foreign faculty of the College, besides the two above mentioned surgeons, were Drs. Wagener and Simmons,

Preparatory Course; Prof. Niewerth, *Materia Medica*; Dr. Cochiuss, a physicist and chemist; Dr. Hilgendorf, naturalist; and Dr. Funk, teacher of the German language, all of whom joined the faculty in 1871–1872.

<sup>346</sup> Mr. Niewerth was about the same time appointed to the Dispensary of this Hospital. Previous to the latter date, Dr. Satō Shōchiū had succeeded Dr. Iwasa Jun as Director, and shortly afterwards, Dr. Hasegawa Taishi, of the Department of Education, was appointed to the post of vice Director. In June, 1873, Dr. Doenitz was called to the chair of Anatomy.

In 1875, non-resident students were admitted to the College, but were only instructed through the medium of the Japanese language. In December, 1876, the College was removed to Kaga Yashiki, Hongō, Ikeda Kensai, chief staff-surgeon of the Army, having previously been charged with the oversight of the affairs of the College. In April, 1877, Ikeda Kensai was made Director, and Nagayo Sensai was charged with the duties of the office of vice-Director.

In the same month, the “University of Tōkiyō” was established, embracing the four departments of Law, Science, Literature and Medicine, of which the medical school constituted the last, under the name of “*Tōkiyō Dai-gaku Igaku-bu*,” or the Department of Medicines of the University of Tōkiyō. In 1878, a library for the use of the College was established, and in the same year, a branch hospital was opened at No. 1. Idzumi Chō, Kanda, where clinical lectures were delivered daily.

In March, 1879, Ishiguro Tadanori, a surgeon of the Army Department, succeeded Nagayo Sensai; and in the same year the buildings of the College and Hospital,



having reached completion, were formally opened, on which occasion the Emperor, accompanied by the Imperial Princes, Prime Minister, Councillors of State, and others, were present, and took part in the ceremonies.

At this time, the number of students, resident and non-resident, was upwards of 140. In the following year the first diplomas of doctor of medicine were bestowed upon eighteen graduates of the German course. In 1880, changes were made in the course of studies pursued, and those who were following the Japanese course were designated as students of the special course.

Among the other foreign professors invited from time to time to fill the various chairs of instruction in the College, since its first opening, are the following :—Drs. Wernich, Gierke, Schultze, Langgaard, Martin, Tiegel, Baelz, Disse, Scriba, Van der Heyden, and Messrs. Korschelt, Lange and Mayet

Besides the Medical Department of the Tōkiō University, there are several other places where medical instruction has been given by foreigners. These are : the Naval Hospital, which was established in 1871 (first at the old English Legation, Takanawa), where Dr. Wheeler was engaged until the beginning of 1874, and Dr. Anderson, from 1872 until his return to England in 1879; the Military Hospital, the foreign appointment to which was held for some time by Dr. Beukema; the City Hospital, attended at first by Dr. Massais, and afterwards by Drs. Manning and Beukema; also an Ophthalmic Hospital attended by Dr. D.B. Simmons, and the Tsukiji Hospital, founded by Dr. Faulds of the Scotch Presbyterian Missionary Society in 1874, and who first introduced Lister's system of antiseptic treatment in Japan. All of these in-

stitutions have furnished instruction, chiefly clinical, to a number of students.

At Kanagawa (now Yokohama) in October, 1859, Dr. J. C. Hepburn was the first Protestant medical missionary to arrive in Japan. He came as a representative of the Presbyterian Board of Foreign Missions, and shortly after opened a dispensary, where for many years he treated most successfully the thousands of patients that came to him from all parts of the country, and gave clinical instruction to a large number of pupils, many of whom have since attained to eminence in the profession. Dr. D. B. Simmons followed Dr. Hepburn but a fortnight later, and ultimately became surgeon-in-chief of the State Hospital, which he assisted in establishing, and where for a number of years he did efficient work in clinical instruction. Since 1859, considerable medical work has been done in Yokohama, principally the dispensary work of Dr. Hepburn, the establishment of the various foreign naval hospitals, and of the temporary military hospital in 1867, with Dr. Willis as surgeon, the General Foreign Hospital, the Japanese State Hospital, (of which Dr. Simmons for a number of years was surgeon-in-chief, and later Drs. Beukema, Wheeler, and Eldridge,) and the Lock Hospital established with the assistance of Dr. Newton, of the English Navy, who was succeeded by Drs. Hill and Lawrence. Besides these, a number of medical men, chiefly English, American, French and German, have resided at Yokohama during varying lengths of time, many of whom have given instruction to native students.

“In 1858–9, the Russians established a politico-religious  
348 mission at Hakodate, part of which was a hospital, under the administration of Surgeon Albrecht, I.R.N. Surgeon

Albrecht immediately began teaching, and soon had a class of half-a-dozen. He was succeeded by Surgeon Zalisky after 5 years, who, in turn, was after three years of service succeeded by a third surgeon, who remained but a short time."

All of these gentlemen, according to Dr. Stuart Eldridge, whose words are quoted above, gave much time to teaching; and judging from the character of the Japanese physicians whom Dr. Eldridge has met, and who owe their past training to this source, the Russian surgeons did their work well.

Following the Russians, and some years later (1872-1874), Dr. Eldridge taught very successfully at Hakodate, carrying on the instruction of over 30 students, and accomplishing much in the way of establishing local hospitals on the Island of Yezo, and in editing the *Kin-Sei-I-Setsu*, or Journal of Modern Medicine, which was established under the auspices of the Colonization Bureau of Yezo. This was among the first of the journals devoted to Western Medical Science published in Japanese.<sup>2</sup>

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2. While in Hakodate, and in 1873, Dr. Eldridge succeeded in making a post-mortem examination of a subject, dead from *kakke* (a disease resembling beri-beri of India and Ceylon, and almost peculiar to Japan). This, it is stated, was one of the first post-mortem examinations obtained by foreigners of a case of this disease.

Dr. Anderson also succeeded in obtaining a post-mortem examination about the same time, an account of which is given in his interesting paper read before the Asiatic Society (vol. vi. part 1.) An account of post-mortems obtained by Dr. D. B. Simmons, who was, it is stated, the first foreigner to observe this disease in Japan, was published in his monograph on "Kakke" by the Inspectorate General of Customs, Shanghai, in 1880. Further reference to this disease may be found in the valuable paper by Dr. Hoffman, who was the first to describe it (German Asiatic Society's Trans., pt. ii. 1873) and in a note by Dr. Henry Faulds, on Parasites, in

349 At Ōsaka in 1867 or 1868, a second medical school, especially for the education of military surgeons, was founded by the Government, and was placed under the direction of Dr. Bauduin from Nagasaki, and in 1871 Dr. Ermerens, also a Dutch physician, was appointed to the charge. In the following year, Hoffman states, the school was closed in favor of the new College just opened at the Capital. In 1872, the Ōsaka City Hospital and Medical School, which seems to have been the same institution as that just mentioned, was established, or rather, reestablished, and has been in operation under Japanese direction ever since that time.

In 1873, Dr. Henry Lanning of the American Protestant Episcopal Board, who was, it is stated, the first medical missionary in Ōsaka, opened a dispensary in that city, which has been in successful operation ever since, and which is now represented by a fine edifice, built last year (1883) and known as St. Barnabas' Hospital, and is capable of accommodating 24 in-patients.

In 1874, Rev. Wallace Taylor, M. D., of the American Board of Commissioners for Foreign Missions, went to Ōsaka, and has since been engaged with great success in dispensary work and teaching.

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the Asiatic Soc. Trans., vol. vi, p. 205, 1876; also articles by Dr. Baelz, pt. 27, Ger. Asiat. Soc. Soc. Trans.; Dr. Hoffman, pt. 2; Dr. Wenrich; Dr. Eldridge, in the Pacific Med. Surg. Journal, Dec. 1880, and Jan. 1881; Dr. J.C. Berry; Dr. Wallace Taylor; K. Takaki, F. R. C. S., in the Catalogue of the Exhibits of the Japanese Sanitary Bureau at the International Health Exhibition, London, 1884; and short notices by the writer (Phila. Med. Times, vol. xx, p. 137) and others. The Japanese medical journals have also published interesting articles upon the subject; one by Dr. Wallace Taylor of Ōsaka on the microscopic appearances of the blood in *kakke*, being now in course of publication in the *Tōkiyō-I-jī Shin-shi*, Tōkiyō Medical News.

During the period which has elapsed since the founding of the first foreign medical school and the present, a military and lock hospital have been established, as well as several hospitals conducted by private individuals.

At Kiyōto, a medical school was established a number of years ago. There was also a hospital with which Dr. Junker von Langeegg, in 1872-6, Dr. Mansfeldt in 1876-7, and Dr. Scheube in 1877-81, were connected.

At Kōbe, Dr. Vedder, who came to Japan as surgeon of the U. S. Steamer *Stonewall*, and who went to Chōshiu about 1864, took charge in 1868 of the first hospital established. After a time he was taken ill, and Dr. Clay temporarily filled his place. Dr. Clay was succeeded by Dr. Harris, of the American Consulate at Yokohama, who continued to give clinical and didactic instruction at the hospital for over a year. Dr. J. C. Barry, of the American Board of Commissioners for Foreign Missions, <sup>350</sup> was the first missionary to give medical instruction to the Japanese at Kōbe, having been appointed, soon after his arrival in the Spring of 1872, to the medical Directorship of the Government Hospital at that place. In 1873 the first dissection in the Prefecture of Hiyōgo was made, the permission granted by the Tōkiyō Government being the result of an application made by Dr. Berry, through the local authorities, to be allowed to teach practical anatomy by dissection. Dr. Thornicraft, an English physician, also assisted in the instruction, in which Drs. S. Nishi and Kimura took considerable part. A number of dispensaries were organised by Dr. Berry within a radius of 20 miles of Hiyōgo, and a hospital of some 40 beds at Himeji, 50 miles distant, was opened.

Dr. Macdonald, of the Canadian Methodist Board,

opened a dispensary at Shidzuoka in 1874. Dr. van der Heyden went to Niigata in the same year, Dr. Palm in 1875, and Fock in 1877. Besides these, there have been a number of medical men engaged in professional work in the interior or un-opened towns. Notably among these was Dr. Willis at Kagoshima, who went thither just before the Restoration, and established a hospital, where he taught with great success for a number of years; Dr. Berry at Okayama, from 1878; Dr. Holterman at Kanazawa, Kaga, and more recently at Niigata; Drs. Junghans and Roretz at Nagoya; and Dr. Cutter at Sapporo. Following the establishment of the Foreign Hospital at Nagasaki, under Drs. Matsumoto Riyōjun and Pompe van Meerdervoort, and of the Vaccination Institute, and Medical School and Hospital at Yedo (Tōkiyō) 1858-1860, there have been schools and hospitals established from time to time, in the principal cities of the empire, in a few of which foreign medical men were engaged to give instruction, and to attend the sick.

The principal government schools were those at Tōkiyō, Hakodate, Nagoya, Kōbe, Ōsaka, Kiyōto, Okayama, Kagoshima, Nagasaki, and Kanazawa, besides which, there have been established numerous private schools and hospitals, notable among which are the schools of Hasegawa and Fukuzawa (the latter now closed), and the hospitals of Drs. Satō and Inouye at Tōkiyō. These hospitals were built after the European model.

Having briefly referred to the principal events relating to the progress of Western medicine during the present  
351 century, and the establishment of the schools and hospitals—especially those in which foreigners have given instruction; and before proceeding to describe the condi-

tion of medical affairs at the present day, a short review of several subjects relating to medicine, *i.e.*, massage, acupuncture, midwifery, and botany, to which frequent reference has already been made, may not prove out of place, and may assist in making more complete the general view of the subject of this paper. As however little more than an outline of these subjects can be given here, the following review is necessarily incomplete.

Beginning then, with the subject of massage, shampooing or manipulation, as the art has been variously designated, the writer takes the liberty of reproducing here a note, by himself, upon the subject, entitled "The Employment of the Blind in Japan," which appeared in the *Philadelphia Medical Times*, of April 7th, 1883:—

A system of employment for the blind so suited to their condition, affording as it does fair profit and an abundance of healthful exercise indoor and out, certainly deserves at least passing notice.

Shampooing, or perhaps, more properly speaking, massage, as practised by these blind men (called *amma*), consists of a gentle rubbing with the palms of the hands of the surface of the whole body, together with passive exercise of the joints, and a slow kneading of the superficial muscles, more particularly those of the trunk and extremities. The sensation to the subject is usually very pleasant, especially if submitted to after violent or continued exertion, as after a difficult climb or a long walk.

Japanese physicians recommend it in *tabes dorsalis* and certain other forms of paralytic disorders, as well as in hysteria and some kinds of headache, in lumbago and in many other diseases, also in convalescence from diseases in which there has been loss of power or wasting of the muscles. It is much used, and probably often abused, in cases of difficult labor. One Kagawa, who first employed it for this purpose, called it "the body-regulating art." It is also generally employed after labor to soften the breasts.

Massage is not employed in rheumatism, gout, or acute fevers. Acupuncture, too, was formally performed by some of these *amma*; and I am

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1. For note on application of the *moxa* see page 289.

told that the examinations for license to practise these art, especially the latter, were very rigorous.

The skill and anatomical knowledge sometimes acquired by these unfortunates is truly wonderful, for, besides a gentle touch and an almost instinctive appreciation of the seat of pain, many of them know all the superficial muscles, and can even tell in what position to insert needles for the cure of certain diseases. Unfortunately, scabies and certain other contagious diseases have been occasionally communicated by these sham-pooers,—a fact, however, which does not seem to lessen the demand for shampooing.

I am told that over one-half of the cases of total blindness in former days was attributable to small-pox; and it is probable that purulent ophthalmia and syphilitic diseases were responsible for the larger portion of the remainder.

The number of blind, deaf, and maimed, according to the published census of 1875, was 101,587, of whom 63,759 were males and 37,828 were females, the total population at that time being 33,110,825. Of this number it is probable that the greater part were blind, and it is not at all unlikely that in former days the proportion of this class to the total population was still greater, as the gradual institution of compulsory vaccination, the regular examination of prostitutes, and the growing popularity of Western methods of treatment of ophthalmic disorders have tended, on the one hand, to limit the spread of the most potent causes of blindness, and, on the other, to increase the number of eyes rescued from actual loss.

Since the "Restoration" in 1868, the ancient laws allowing the blind certain rights and privileges have been repealed, and the profession is now open to all. Formerly the blind belonged to the so-called "long-robed" or professional class, in which were also included those who practised the arts of acupuncture and divining, and the priests and the doctors. Various titles or degrees were bestowed upon the blind, after passing examinations and the payment of certain fixed sums of money. The lowest of these degrees, next to that of the common *amina*, was the *shibun*, which gave the possessor certain rights and privileges and raised him to the rank of the military or two-sworded class. He was also permitted to wear a ceremonial dress on certain occasions and to carry a whitestick surmounted by a woollen ball. The fee for this degree was about one hundred dollars. Upon obtaining the next degree, that of *ko-to*, the blind man ceased to practise the art of shampooing, and became a teacher of music, for which position he had been preparing during the



chrysalis state, so to speak, of shampooer. Above the degree of *ko-to* came that of *ken-giyō*, or inspector, the fee for which was one thousand dollars. To obtain this degree, was considered a great honor, and among its possessors were to be found some very remarkable men. One of these, Hanawa Ken giyō by name, a professor of mathematics, is said to have possessed such a wonderful memory that he would recognize at once a quotation made from any book in his great library, and could give the title of the book and even the number of the page from which the quotation had been made. It is also said that, although he had been blind from infancy, he knew the names, forms, and meanings of nearly all the Chinese characters in use, and was, besides, a writer of note.

The highest degree or rank, was that of *sō-roku*, of which there were, I understand, only two holders at one time one in each of the 353 capitals. All the appointments and honorary titles were conferred through these *sō-roku*, who also acted as judges in matters relating their own people.

A certain amount of authority was attached to the lower ranks, and no doubt added considerably to the income of the possessors. On occasions of great rejoicing in a household, as, for instance, a birth, a marriage, or elevation in office, one of these blind shampooers would call for a present, which by law it was necessary to make, and which ranged from ten or fifteen cents upwards, according to the wealth and position of the family. The collection of these fees fell to each *shi-bun* in every district in turn, besides which fees were also received from apprentices.

In order that a blind man might travel from place to place, and yet not interfere with other blind practising in these places, his stay in each town or village was limited to three days, during which time only was he allowed to receive fees for professional services.

The blind were also permitted to lend money, for which they received high rates of interest, popular sentiment protecting them from loss. A blind man might marry, only after he had taken a degree, as this was considered proof that he was able to provide for a family; but marriages between blind and blind were strictly forbidden. There were also societies or guilds of blind men, which afforded their members considerable protection.

This whole system has proved of great utility in giving these unfortunates opportunity of competing on a most favorable footing with their more fortunate brethren, and at the same time stimulating them to higher attainment. Such, indeed, was its success that the blind, unfortunate as they might be in the loss of sight, led happy and comfortable lives;

supporting themselves and families, and proving, as well, a benefit to their fellow-creatures. It is therefore, not without some feeling of regret, that we see these old institutions passing away, and in their stead attempts being made to care for the blind in large asylums and at public expense.

The experiment of teaching a few of our own blind this most useful art, though, I believe, yet untried, is perhaps worthy of consideration, especially as massage is beginning to have an important place in the treatment of so many disorders.

The practice of massage, although in a measure a distinct art, has nevertheless been associated with the practice of acupuncture, so that those who have become skilful in either of these subjects, have as a rule been acquainted with the other, and also with the art of cauterization with the *moxa*.

The subject of the origin of the art of acupuncture, may be dismissed for the present, with the statement, that it is not Japanese. It must be admitted, however, that considerable improvement has been made by physicians of Japan in the form and mode of employment of the needle.

As practised by the Japanese acupuncturists, the operation consists in perforating the skin and underlying tissues to a depth, as a rule, not exceeding one-half to three-quarters of an inch, with fine needles of gold, silver, or steel. The form and construction of these needles vary, but, generally speaking, they are several inches long, and of an average diameter of one forty-eighth of an inch. Each needle is usually fastened into a handle, which is spirally grooved from end to end.

To perform the operation, the handle of the needle is held lightly between the thumb and first finger of the left hand, the point resting upon the spot to be punctured. A slight blow is then given upon the head of the instru-

ment with a small mallet held in the right hand; and the needle is gently twisted until its point has penetrated to the desired depth, where it is left for a few seconds and then slowly withdrawn, and the skin in the vicinity of the puncture rubbed for a few moments. The number of perforations range from one to twenty, and they are usually made in the skin of the abdomen, although other portions of the body are not unfrequently punctured. The different locations to be punctured for various diseases, are fixed by rules illustrated by diagrams, as in the *Jū-shi-kiyō* (十四經), a work now to be obtained at almost any of the second-hand book stalls. The diseases in which acupuncture is employed are very numerous and cover almost the whole range of medicine, but it is most successfully used in colic, and other spasmodic disorders.

Mention has already been made (p. 267) of the fact that acupuncture formed one of the branches of instruction at the University, established in the seventh century, but the art must have been known and practised at a much earlier period, as it is treated of in several ancient Chinese works, such as the *Rei-sū* (p. 261) and *Yakushō-mei-dō-dzu* (p. 262) brought over from Korea before the end of the sixth century. It seems, however, that during the middle ages the art lost its importance as a branch of instruction in the University, and, it is stated, was finally dropped out of the curriculum. In the year A.D. 1682 the Shōgun Tsunayoshi, desirous of reviving the practice of this art, charged Sugiyama Waichi with the task. Sugiyama, Mr. Kaku states, was a native of Hamamatsu in Tōtōmī, and having lost his sight at the age of ten, he took up his abode in Yedo, and became a pupil of Yamase Takuichi, a

355 *Ken-giyō*.<sup>4</sup> Yamase was a pupil of Iriya Yoshiaki of Kiyōto, who had received instruction from Iriya Yoriaki, his father. Iriye, the senior, was a pupil of a medical officer under Toyotomi, and called Sonoda Dō-ho, who in turn received instruction from a Chinese named Go Kintatsu at the time of the invasion of Korea by Hideyoshi Toyotomi, in the latter part of the sixteenth century. Sugiyama was very successful in the use of the needles and gained for himself a great reputation. The story is told of him, that on one occasion he was called to attend the Shōgun, who was so pleased with his treatment that he asked Sugiyama how he might reward him. Waichi answered, "If it may please Your Highness, I should like to have one eye." To this the Shōgun replied, laughing, that while he could not give him an eye, he would give him a residence in *Hitotsu-me-chō* (One-eye street) in Honjo, Yedo. He was also given an annual pension of 500 koku<sup>5</sup> of rice, and was raised to the rank of superintendent of the blind in the Kuwanto<sup>6</sup>, and was later ordered to establish a school of acupuncture. He was the inventor of a peculiar kind of needle called the tube needle, employed very generally at the present time. He was the founder of the Sugiyama School and author of the works known as *Sugiyama-ryū-shu-kuwan*,<sup>7</sup> and *Sen-shin-ron*,<sup>8</sup> both on acupuncture. He died at Yedo in 1694.

Mishima Anichi, a pupil of Sugiyama Waichi established numerous schools for teaching acupuncture, and did much to extend the knowledge of his art. He was

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4. An official of the highest rank among the blind.

5. The koku is equal to 4.929 bushels.

6. The eight provinces in the vicinity of Yedo.

7. 杉山流首卷

8. 選鍼論

the author of the following works: *Shin-den-riū-kuwan* (真傳流卷), *Shin-den-riū-hi-kuwan* (真傳流秘卷), and the *Betsu-den-san-kuwan-hō*, (別傳三關法); the two former on the *Shin-den-riū* or true schools and the latter on the three important methods of acupuncture.

Another school of acupuncturists was that called the *Suruga-riū*, of which Matsuoka Isai was the founder. Matsuoka lived at Kiyōtō in the early part of the 17th century, and used needles of gold and silver, which he drove through the skin with a flat headed mallet.

The Yoshida school was established by Yoshida Ikiū, who spent seven years in China during the reign of the 356 Ming Dynasty. He was the author of a book called *Shi-shin-ka-kan* (刺鍼家鑑), or Household Mirror of Acupuncture.

Kakimoto Shingen, who flourished during the latter half of the eighteenth century, was the author of several works, among which were the *Ki-sai-roku* (熙載錄) and *Hen-dō-roku* (砭道錄), the latter on the use of the stone needle. He employed needles of three sizes, the largest of which he called the *hi-yō-shin*, or, "garlic-stalk needle." It is said that he even punctured blood vessels, and without bad results.

Suganuma Nagayuki, native of Settsu, employed needles of steel in his practice.

The subject of Japanese midwifery, is one which, from some standpoints, presents to the foreigner more of interest than perhaps any of the special subjects heretofore mentioned; for in the progress of this art, there is to be seen a development as striking as it is original.

Glancing over the history of the subject, we find that until within the past two centuries, but little was known

of the physiology of gestation or parturition, or of measures to relieve abnormal conditions arising during pregnancy and labor. Indeed, it can hardly be said, that before the introduction of Western science, anything was known of the former of these subjects, whilst the knowledge possessed of the latter, was but empiric at the best. We cannot but admire, however, the ingenuity of some of the means employed to assist or correct the efforts of nature, means which have evidently been the result of long experience and study.

Among the earlier references to this subject in Japanese history, is the well known legend of the Empress Jingō, who, after the death of her husband, and in the midst of the preparations for an invasion of Korea in the beginning of the second century (A.D.), found herself with child, to postpone the birth of which, until she should have accomplished her purpose, is said to have worn a stone beneath her girdle.

The use of the girdle, by Japanese women during pregnancy, it is stated, can be traced back to this time, although its employment now has for its object the safe and speedy delivery of the child.

In early times the practice of midwifery was followed almost entirely by females, male physicians being called in only to prescribe medicines.

- 357 Later, midwifery became one of the studies of those physicians who believed in the different spirits (already mentioned, p 323), the derangement of which in the body, was held to be the cause of disease. Parturition, it is stated, was held to be related to the blood, which was one of the sources of disease.

Among those who held these views, were Yoshimasu

and Nakajo, from the latter of whom many of the midwives of recent times claim to have received the traditions of their art.

In the eighteenth century, Kagawa Genyetsu and Koku-meï both contributed much toward the advancement of this art. Kagawa, it is stated, was a native of Hikone in the province of Ōmi, and was born in a family whose pursuit was that of husbandry, and who had served under the prince of that province. Secretly studying medicine, he became also skilful in acupuncture and manipulation, and practised his art at Kiyōto. On one occasion, Mr. Kaku relates, a distressing case of protracted labor had occurred in a neighboring house, and Kagawa, after lying awake a whole night trying to devise some means of relief (it was a case in which an arm and leg presented), went to the woman in the morning and soon succeeded in delivering the child. The same writer states that Kagawa was a self-educated man, and that his knowledge of midwifery was the result of his own experience. He was the author of a work on midwifery, known as the *San-ron* (産論), and widely read in Japan even to the present day. He was succeeded in his work by his pupil and adopted son, Genteki, who was the author of an explanatory treatise on the *San-ron*, called *San-ron-yoku* (産論翼). The descendants of Kagawa Genteki are, according to Dr. Miyake, Kagawa Mitsusada, Kagawa Mitsutaka, and Kagawa Mitsunori, the latter of whom, at the time when Dr. Miyake wrote,<sup>9</sup> had a large practice in Tōkiyō.

Hiruta Kokumei was a native of Shirakawa, and was,

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9. German Asiatic Society's Trans., 1874, pts. v. and x, "Japanese Midwifery," by B. Miyake.

like Kagawa Genyetsu, born in a family whose occupation was agriculture. In theory, he held that normal gestation was but a natural process, and in no wise of a pathological nature, as some supposed.

He divided the principles of the art, according to the writer quoted above, under the following heads: 1, 358 Right restoration; 2, Shortening of the period; 3. Opening out; 4. Safe preservation; 5. To straighten and urge; 6. Safe delivery; 7. Conditions of expulsion; 8. Hæmorrhage, etc.; 9. Retardation; 10. To give up (the child and save the mother). He wrote no books, but a pupil named Tomisawa Haruo was the author of a work caled *Yō-ka-son-sei* (孕家遵生), while still another pupil named Numano Saishō wrote a book known as *Den-shi san-soku-sen-sho* (田子産則全書), both of which works relate to the subject of midwifery. As above stated, the *San-ron*, or Discourse on Midwifery, has been for the last century the standard authority of Japanese obstetricians of the Chinese school; and has been thought of sufficient merit to be worthy of translation into German, a task performed a few years since by Dr. B. Miyake, then "Interpreter to the Imperial Medical and Surgical Academy at Yedo," the interesting results of whose labor, together with remarks by Dr. Müller, appeared in the Transactions of the German Asiatic Society (parts v. and x. 1874).

To do justice to this interesting work, more space would be required than can here be given it, but a few quotations from the translation above referred to, will perhaps suffice to give some idea of its contents.

As to the division of the work, it is stated that it is divided into four parts, namely:



- " 1. Development of the embryo; period of gestation.
- " 2. Choice of place where delivery may take place; and position of woman during labor.
- " 3. Treatment after delivery.
- " 4. On the use of the chair and abdominal bandage.

" The divisions of the *San-ron-yoku* or Explanations of the *San-ron*, are as follows :

" Diagnosis of pregnancy; Examination of the womb; Diagnosis of the position of the foetus when in the wrong place; Diagnosis of twin pregnancy; Massage of the abdomen; Evacuation of the 'waters;' Position of the woman upon the mats; Changing the bed; Cutting the cord; The first bath after confinement; The treatment of the new-born child; Treatment of prolapse of intestine, uterus and rectum, hæmorrhage, vertigo, and convulsions."

Under the first head it is stated, among other things, that in pregnancy the pulsation felt in the tips of the four fingers (determined by placing the fingers of the patient 359 against those of the physician, tip to tip), and those of the arteriæ cruralis, are stronger than those of the radial artery.

All tumors not corresponding in position and size to the gravid uterus, were thought to be collections of air, excrements, or blood.

It is also mentioned that in case of abortion during the first three months of gestation, the embryo is round, and if cut in two shews five colors, thus conclusively proving that the human body is the true essence of the five elements (p. 294), water, fire, metal, wood and earth. Kagawa also believed that the sex of the child might be known by the position of the foetus, male, if on the left

side, and female, if on the right; the head, he held, was always in the middle and downwards.

In the treatment of the different abnormal conditions consequent upon child-bearing, a number of decoctions, mixtures, etc., are advocated. These contain, for the most part, remedies already mentioned; one, however, is given here as a specimen. It is known as *Riū-to-in*, and employed in case of vomiting of blood, bleeding of the nose and sudden pain in the chest:—*Levistici senkin*, *Andrographidis*, one drachm each; *Rhei*, one-half drachm. To be made into an infusion with 6 ounces of hot water, and the whole taken at one time.

The second division of the *San-ron* in reality treats of the whole subject of parturition, and the descriptions therein given, although lacking anatomical accuracy, are evidently those of one acquainted with the subject.

In the third part the following prescription is given as a lactagogue, and is known as *Nū-sei-tō*:—*Atractylodes alba*, *Paeonia albiflora*, *Levistici officinalis*, *Levistici senkin*, *Pachymæ cocos*, *Cinnamomi*, *Euonymi japonici*, *Olibani*, one drachm each, *Glycyrrhizæ* gr. vi.

The fourth part, it is stated, is intended to warn against the use of a kind of a chair popular at that time, and also against the use of the girdle before mentioned. The author likening the use of the latter to the placing a heavy stone upon some young plant, and thus arresting its development. He also discourages the undue use of massage—remarking that were we to continually manipulate the roots of any plant, no matter how enduring, growth would be retarded and the plant might eventually die.

If we take the work as a whole, its descriptions, viewed

from the limited knowledge of the day, are surprisingly 360 accurate, and shew clearly the genius of its author. A rather curious instrument called the whalebone sling, was the invention of Kagawa Mitsusada, the grandson of Kagawa Genyetsu. By means of this instrument a cord could be passed over any portion of the fœtus, and in some instances, an easy delivery effected. As the results were not infrequently disastrous both to the child and its mother, and, as such instruments were not allowed to be used at all at the court, the son of Mitsusada, Kagawa Mitsutaka, invented a kind of cloth forceps, which consisted of a wide band of strong linen or silk, attached to two long slender rods, and rolled upon them (as ancient scrolls were rolled). These were introduced within the uterus and unrolled about the head of the fœtus, after which the sticks were withdrawn, and a flat vectus-like stick of whalebone, having a small hole for the passage of the ends of the cloth, was passed over them, and into the vagina. The cloth then enveloping the head and passing out through the hole in the vectus afforded a strong hold, and made altogether a powerful instrument. Illustrations of these instruments appear in the Transactions of the German Asiatic Society, above referred to. A description of one of them—the whalebone sling—is also to be found in the Transactions of the College of Physicians of Philadelphia, for the year 1877 or 1878, in an interesting paper on Japanese obstetric practice, by Dr. J. C. Berry of Okayama, presented by Dr. W. W. Keen of Philadelphia.

Dr. Erwin Baelz has also, the writer believes, made some contributions to this subject, although reference to them is not at hand. His measurements of the female

pelvis, as well as the notes of Dr. Döenitz on the same subject (German Asiatic Society, Trans; 1873) are of interest. There is also an article by Dr. Hoffmann in the Transactions above mentioned, upon means employed by the Japanese to produce abortion, in which it is stated that the flexible roots of the *Achryranthes aspera*, Thunb., pointed and smeared with musk, are often employed; also bamboo sticks likewise prepared. To the list of the substances mentioned in the paper above, Dr. Geerts has added the following (Trans. (1874, pt. v.): *Achryranthes bidentata* (flower) var. *Japonica*, Mig. stalks of *Nandina domestica*, Thunb., with musk pills internally. At Nagasaki the stalks of *Ligularia Kaempferi*, Sieb. et Lucc. are used.

- 361 The study of botany has occupied a most important place in the education of physicians of the Chinese school since the earliest times; indeed, long before medical theories were formulated, the healing virtues of certain plants were known, and use was made of this knowledge in the treatment of disease. *Hon-sō-gaku*, or the science of botany, originally included not only the vegetable kingdom, but also the animal and mineral, and works upon this subject usually contained descriptions of the appearance and the therapeutic properties of such substances as were employed as medicines. They often contained rules for prescribing, as well as medical discussions, and might more properly be described as treatises on materia medica, rather than on botany alone. Reference has already been made in this paper to the *Hon-sō*<sup>10</sup> and other works relating to botany and materia medica, but as no observations have been ventured upon

these subjects, a few remarks here may not be out of place. Mr. Kaku, in the work to which reference has already frequently been made,<sup>11</sup> gives a short history of the subject from the sixteenth century, the substance of which is given below.

As already stated, the cultivation of medical plants has been practised in Japan since ancient times, and the office of Government Botanist, created as early as the fifth or sixth centuries, has been held by men of great learning.

During the first or second decade of the tenth century, the *Hon-sō-wa-miyo* (p. 278), by Fukaya Sukehito, made its appearance, and several centuries later, towards the close of the sixteenth century, the *San-rui-hon-sō*, by Yoshida Sojūn (p. 283). Yoshida Sōtatsu is said (p. 283), to have been the author of a *Hon-sō* with Japanese names. The *Yamato-hon-sō*, or, Japanese Botany, published by Kaibara Tokushin of Chikuzen, and Mukai Genshō of Hizen, in 1709, is said to have been the result of extensive study on the part of its authors, who, unlike their predecessors in the work, made comparisons of native plants with those from abroad, and noted all differences occurring. After this, Inao Nobuyoshi of Kiyōto published the *Sho-butsu-rui-san* (庶物類纂), a botanical encyclopedia consisting of one thousand volumes (fasciculi).

Inao was a pupil at Ōsaka of Fukuyama Tokujun,<sup>362</sup> who had received instruction from Rosōseki, the author of a work called *Yaku-shō-shū-yō* (藥性集要) relating to the qualities of medicines.

Inao was also author of the *Hon-sō-dzu-yoku* (本草圖翼), an illustrated botany; *Shoku-motsu-hon-sō* (食物本草), or, Botany relating to Food; *Butsu-san-moku-roku* (物產目錄), or, List of Productions; *Sai-yaku-doku-dan* (採藥獨斷), on the Selection of Medicines; and *Shoku-butsu-den-shin-san* (食物傳信纂). He numbered among his pupils such famous men as Matsuoka, Tamba or Nara.

Abe Shōnin, who lived at Yedo, also did much to advance botanical knowledge, and is spoken of as one of the great authorities upon the subject. Inao was succeeded by his pupil Matsuoka Gentatsu of Kiyōto, who was a very successful teacher, and who wrote the following medical works: *Sen-kin-hō-yaku-chiū* (千金方藥註), a medical commentary upon *Sen-kin-hō* (p. 277).

*Hon-itsu-ka-gen* (本草一家言), Short Explanations of the *Hon-sō*; *Yamato-hon-sō-itsu-ka-gen* (大知本草一家言) Short Explanations of the *Yamato-hon-sō*; *Iō-yaku-su-chi* (用藥須知), Necessary Information on the Use of Medicines; *Hō-chiū-sei-yō* (庖厨正要), Useful Hints for the Kitchen; *Shoku-riyō-sei-yō* (食療正要), Useful Hints on Food and Health; *Nichi-yō-shoku-sei-shō-kei* (日用風性捷徑), on the qualities of articles of food in daily use; and *Hon-sō-i-gen-teki-yō* (本草彙言摘要), on the classification in botany.

Among the pupils of Matsuoka were Ono and Iwanaga. Tamba Teiki, a pupil of Inao, published by order of the Government, the *Sho-butsu-rui-san sō-ho*, or *Sho-butsu-rui-san*, with additions. He afterwards travelled extensively through Japan, and made report to the Government of his observations upon the botany of the country. In the year 1730, and together with Hayashi Rioteiki, he published by order of the Shōgun Yoshimune, the *Fu-kiū-rui-hō* (普救類方), or, Prescription for a Universal

Remedy, a popular work, intended as a household medical guide.

Ono Motohiro, a native of Kiyōto, and pupil of Matsaoka Gentatsu, was a noted botanist, and is classed by Mr. Kaku with *Ri-jī-chin* (Le She-chin) the compiler of the *Hon-sō-kō-moku* (p. 273), and Linnæus, as one of the three greatest botanists the world has produced. In or about the year A.D. 1800, Ono was summoned to 363 Yedo, where he delivered lectures on botany at the Sei-ju-kuwan. He also spent considerable time in travel, and finally published the *Kō-sun-setsu* (廣參説), A Comparison of Medical Theories, and the *Hon-sō-kei-mō* (本草啓蒙), or, Botany for Beginners (p. 255). Ota Shōzen, son of Iwanaga Genkō, a pupil of Matsuoka, was a botanist of most conservative views, but a man of wide reading, whose teachings did much good.

One of the most learned men of this time was Abe Shōnin, a native of Nambu. While yet a young man he went to China, where he spent eighteen years in the study of botany. In or about A.D. 1730, and after his return from China, he was appointed by the Government to search the provinces lying along the northern seas for new medicinal herbs. It is stated, that during the time of his service he visited Yezo three times, and that he established a garden for the cultivation of medicinal plants in the eastern part of the city of Yedo. He discovered the existence of *scutellaria macrantha* in provinces where it had hitherto been unknown, and also shewed that much of the several hundred thousand pounds of the plant imported annually from China under this name was spurious. It is stated that he found *dai-bu-shi* (great), aconite *Fischeri*, in Yezo. He was the author

of the *Sho-koku-sai-yaku-ki* (諸國採藥記), in which is given an account of medicines obtained in the various provinces. Later, an abridged edition of this work was published by his pupil Uyemura Masakatsu, under the title of *Sho-koku-sai-yaku Shō-roku* (諸國採藥記抄錄). Another pupil of Abe Shōnin, named Tamura Noboru, was appointed superintendent of a government establishment where medicines were manufactured.

Tamura is said to have given great encouragement to the cultivation of ginseng, and to have discovered many plants. He was the author of numerous works, among which are the following: *San-sei-hi-roku* (參製秘錄), on the secret of making ginseng medicines; *Nin-jin-kō-saku-ki* (人參耕作記), on the cultivation of panex ginseng; *Nin-jin-fu* (人參譜), on the ginseng plant; *Kai-sho-sei-zō-den* (甘蔗製造傳), on the manufacture of sugar from the sugar cane; *Mo-men-bai-yo-den* (木綿培養傳), on the cultivation of cotton; and *Ni-hon-sho-shū-yaku-fu* (日本諸州藥譜), on the medicines of the several provinces of Japan.

364 His son Tamura Zenshi was a botanist of note, and wrote a work known as *Dzu-shū-sho-tō-butsu-san-dzu-seitsu* (豆州諸島物産圖說), on the production of Idzu and neighboring islands, with illustrations.

Several notices have appeared within the past few years of the foreign literature upon the subject of the flora of Japan, and also short references to the materia medica of the Japanese. The following references on the flora of Japan are taken from the *Encyclopædia Britannica* (see Japan):—

The great authority on the Japanese flora is Franchet and Savatier's *Enumeratio plantarum in Japonia sponte crescentium*, Paris, 1875-1879,



2 vols., which contains 2743 species of phanerogamic plants, 700 species more, that is, than were given by Miquel, who in 1866 contributed a survey of the subject to the *Mededeelingen* of the *K. Akad. van Wetensch.* (Amsterdam), and in 1870 published *Catal. Musei Botanici*, Leyden, (part I, *Flora Japonica*) on the bases of the rich collections of the Leyden Museum. Much interesting matter will also be found in Rein's contributions to Peterman's *Mittheilungen*, 1875 and 1879; in the *Mittheil. der deutsche Ges. für Natur und Völkerkunde Ost-Asiens*; and in Knipping's "Ozaka, Kioto, etc., in Nippon," in Peterman's *Mittheil.*, 1878. It has been shown that the Japanese flora as a whole has a great similarity, not only to that of the neighboring Asiatic continent, but also to that of North America, the coincidences being most frequent, however, not with the flora of the eastern but with that of the western coast.

Dr. Geerts, in a paper upon the Pharmacopœia of Japan published in the German Asiatic Society's Transactions (1874, pt. iv), also gives a list of publications upon the subject, which includes notices of the literature of the flora of China, and Chinese Materia Medica as well, and from which the following references have been obtained.

Dr. Andries Cleyer, *Specimen Medicinæ Sinicæ*, Frankfurt, 1692; Englehart Kaempfer, *Amœnitates exoticæ* (1702); Kaempfer's *Japan*; Du Halde, *Description de l'Empire de la Chine*, Paris, 1735; Thunberg, *Flora Japonica*, Leipsic, 1784; I. Loureiro, *Flora Cochinchinensis*; Abbé Grosier, *Description de la Chine*, 1787; Ph. Fr. von Siebold, *Flora Japonica*, 1832; Hoffmann and H. Schultes, *Noms indigènes d'un choix de plantes du Japon et de la Chine*. (Extract No. 10 de l'année 1852 du journal asiatique); Asa Gray, *Botany of Japan*, 1865; F.A. Guil. Miquel, *Profusio Floræ Japonicæ*, Amsterdam, 1867; *Archives Néerlandaises*, pt. ii, 1867, *Verslagen en Mededeelingen der Koninkl. Akademie van Wetenschappen, Afd. Naturkunde*. Berkley, Monograph, *On some tuberiform*

*vegetable productions from China*, Journal of the Linnean Society, III, No 10, 1858; Suringar, *Algæ japonicæ Musei botanici Lugd. Batav.*, Harlem 1870; Dabry, *Médecine des Chinois*, Paris 1863; Dr. Larivière, *Études sur la médecine Chinoise* (Journal de Médecine de Bordeaux), 1863; Lapeyre *Recueil des mémoires de médecine, chirurgie et pharmacie militaires*, pt. 6, 1861; Dr. James Henderson, *Medical Practice and Literature of the Chinese*, Journal of the North China Branch of the Royal Asiatic Society, No. 1, Dec. 1864; Dr. Hobson, *Chinese Medicine*, in the Medical Times and Gazette, Nov. 18, 1860; *Catalogus Medicamentorum sinensium quæ Pekini comparanda et determinanda curavit Alexander Tatarinov*, Doctor Med, missionis Rossicæ Pekinensis spatio annorum 1840–1850, Petropoli 1865; Daniel Hanbury, Notes on Chinese Materia Medica; Pharmaceutical Journal, July, 1860; also reprint, London, E. Taylor, 1862; J. O. Debeaux, *Essai sur la Pharmacie et la matière médicale des Chinois*, Paris, 1865. To these references may be added Dr. E. Bretschneider's valuable paper entitled, *Early European Researches into the Flora of China*, in the Journal of the North China Branch of the Royal Asiatic Society, 1880, New Series, No. XV; Mr. F. Porter Smith's *Notes on the Materia Medica of China*, Shanghai, 1871; *Nippon-shoku-butsu-mei-i*, or Nomenclature of Japanese Plants, by Prof. Matsumura, Tōkiyō, 1884; an article upon the flora of Japan in Satow and Hawe's Northern and Central Japan, (Murray's) second edition, 1884; and Dr. Williams' Chinese Empire, second edition.

It should perhaps be mentioned here, that the cultivation of medical plants has of late been carried on in Tōkiyō in connection with the preparation of the New Japanese Pharmacopœia, the near completion of the draft

of which, in 1881, rendered it then necessary to have at hand more extended means of examination of the physical and therapeutic characteristics of the medical plants of this and other countries. With this object in view, a botanical garden was established at Sashigaya machi, whither plants were transferred from the Imperial, and University Gardens. Previous to this a smaller garden had been established near the Agricultural College, Komaba, Tōkiyō, but being at an inconvenient distance from the Sanitary Bureau, and but of small extent, it was given up, and the plants transferred to Sashigaya machi.

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## V. STATE OF MEDICAL AFFAIRS AT THE PRESENT TIME. 366

In the preceding chapters a brief summary has been given of events, occurring between the middle of the sixteenth century and the beginning of the present reign, and relating to medical progress in this country.<sup>1</sup> In the following pages of these "notes," it is proposed to describe, briefly, the state of medical affairs in Japan at the present time; and for sake of convenience, the subject is divided as follows: Medical and Sanitary Control; Medical

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1. The order of arrangement followed here has been, on the whole, chronological. It has been found necessary, however, in places, and in order that certain events should appear together, to arrange these events according to subjects; as, for instance, the rise of schools of medical opinion; the history of specialties, instruction by foreigners in the open ports and elsewhere, and the establishment of medical schools and colleges. This in turn has necessitated, in some instances, and in order to make each subject more complete, the mention in the preceding chapter of facts properly belonging to the present.

Bureaux of the Army and Navy; Schools, Colleges, Hospitals, etc.; Societies: Medical Missions; Literature, Libraries, etc; Medical Practice; and Concluding Remarks.

MEDICAL AND SANITARY CONTROL.—All Medical and Sanitary matters, with the exception of the control of medical education (i.e. of schools and colleges), and of the Medical Bureaux of the Departments of the Army and Navy, are now under the supervision and control of a bureau of the Home Department. This bureau was originally established under the Department of Education in the early part of 1873, and was then known as the Bureau of Medical Affairs.<sup>2</sup> By it, a preliminary sanitary code was formulated, "almost identical with the sanitary codes of Europe and America," which was presented to the Privy Council, and has by that body, from time to time, been, for the most part, brought into effect by various proclamations and notifications. Alterations and amendments, however, have been made in the original provisions of this code, and also in the laws relating to them.

In June, 1875, this bureau, together with the administration of sanitary affairs, was transferred to the Home  
367 Department and is now known as the Central Sanitary Bureau. In each Prefecture and in the three Prefectural Cities of Tōkiyō, Kiyōto, and Ōsaka, local sanitary officers, constituting the local sanitary bureaux, have been appointed under the supervision of the Home Department and in communication with it through their respective local Governments. These officers are charged with the care of all matters relating to public health, including the

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2. *I-mu-kiyoku*. First and Second Annual Reports of the Central Sanitary Bureau. There was also, in the middle ages, a Bureau of Supervision of Medical Affairs, mention of which has already been made (p. 263).

inspection of the manufacture and sale of drugs and medicines, the supervision of physicians and apothecaries, etc., granting permissions for post mortem examinations, the control of the sale of foods, beverages, cosmetics, dyes, etc.; the inspection of water supplies, sanitary condition of lodging and tenement houses, theatres, public schools, hospitals, jails, streets, drains, etc., etc.; the collection of statistics of brothels, marriages, deaths, etc., and with carrying out special measures deemed necessary in times of the prevalence of epidemics, as well as the collection of reports upon medicinal herbs found within their respective localities, etc. Matters relating to new establishments or repairs, are required to be laid before the Local Sanitary Boards before being acted upon, and the more important of these are to be referred to the Home Minister.

There is also an advisory body called the Central Sanitary Board,<sup>3</sup> composed of eighteen<sup>4</sup> or more members, including eleven physicians, two chemists, two engineers, the directory of the Sanitary Bureau, a police inspector, and a secretary of the Home Department. The business of this body is to deliberate upon such sanitary matters as shall be brought before it by the Home Minister. There are also local sanitary boards, each composed of from three to five physicians, three members of the local assembly, the director and chief apothecary of the Local Government Hospital, the director of the Local Sanitary Bureau, and an executive officer of the Local Government. These local sanitary boards hold the same relation with the Local Governments and Sanitary Bureaux as that

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3. Chiū-ō-Yei-sei-Kuwai.

4. In this number are at present included six foreign physicians.

held by the national or Central Sanitary Board with the Home Department and the Central Sanitary Bureau.

Interprovincial sanitary conventions are held annually at some convenient point in each of the five sanitary divisions of the empire.

- 368 The laws relating to the practice of medicine and surgery, require that every physician or surgeon so practising shall hold a license from the Government. These licenses; except in the case of persons who were in practice before the year 1875 and certain other cases, to be mentioned in another place, can only be obtained upon passing satisfactory examination in natural philosophy, chemistry, anatomy, physiology, materia medica, practice of medicine and surgery, ophthalmology, obstetrics, and clinical diagnosis. The first four of these branches constitute the first, and the following six branches the second, or pass examination. These examinations, which are held semi-annually in different districts of the several prefectures of the empire, are conducted by and under the control of a special officer detailed for the purpose by the Home Minister. This officer is assisted by a certain number of prominent physicians, chemists, and professors, also appointed by the Home Minister, and who are residents of the locality in which the examination is held. The time and place of these examinations is notified in each district by the Home Department; and applications of candidates are required to be sent in at least one month before the examination takes place. The certificates of candidates must be signed by at least two practising physicians or teachers of medicine, and no candidate is eligible for the first examination until he has pursued his medical studies for at least eighteen months, nor for the second, or pass

examination until having pursued his studies for a period of three years, and at least six months after his first examinations. In case of rejection, the candidate is referred for a period of six months or longer, as may be decided upon.

The questions asked at these examinations are previously determined by the examining board, and are, for the most part, required to be answered in writing. The fee for the first examination is three yen, and for the second, five, payable in advance and not returnable in event of the non-appearance of the candidate or his failure to pass. The fee for the license is three yen.

The Home Minister is empowered to grant licenses to practise without examination, to those who possess the diplomas of the Government or recognized foreign medical schools, and also in special cases in districts where there are very few educated physicians, and where, in his opinion, necessity demands. In this latter case, the <sup>369</sup> request must be first made by the Local Government, and then, if granted, the license is only for a limited period.

An official list of physicians licensed to practice has been issued by the Home Department, and additions thereto are, from to time, notified by the Department as licenses are issued. A duplicate license in case of loss or mutilation of the original may be obtained upon payment of one yen; while the licenses of those who have given up practice must be returned to the Home Department.

The licenses of physicians who have been guilty of grave misdemeanor or crimes, may be revoked either for a time or altogether, as may be decided by the Home Minister after consultation with the Central Sanitary Board.

These regulations<sup>5</sup> just mentioned were decreed in October, 1883, and went into force January, 1st, 1884, in respect to the whole empire, the licenses already granted still remaining valid. The degree of Master of Medicine, *I-gaku-shi*, is only bestowed upon those who have been graduated at the Medical Department of the University of Tōkiyō.

Dentists, by the regulations issued at the same time with those above mentioned and also previously, are required to take out licenses to practice, which are obtainable upon passing satisfactory examination on the following subjects:—dental anatomy; physiology; dental pathology and treatment; materia medica; instruments used by dentists; and practice of dentistry.

The examination is made by the same board whose duty it is to examine candidates for the license to practice medicine, a dentist, however, participating in the examination whenever candidates for the dental license come up before it. The period of previous study required is two years, and all branches may be passed at one time. The fee for the license is three yen.

Oculists and other specialists, and also midwives, are 370 required to pass examinations in certain subjects. Women are now permitted to practice medicine; and two are reported to have recently passed satisfactory examinations and obtained diplomas.

Under the title of "Laws for the Prevention of Contagious Diseases," regulations are in force requiring the registration and regular medical inspection of public women,

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5. A translation of which has since appeared in the English Supplement to the Transactions of the Society for the Advancement of Medical Science in Japan, No. 2, pp. 15-16, 1885.



for the care and treatment of whom, hospitals have been erected in all the larger cities and open ports of the empire. Regulations have also been issued respecting the prevention of small-pox, and vaccination is now compulsory throughout the empire.

The laws respecting the prevention of cholera and certain other diseases, may be brought into force by the Home Minister at any time when epidemics of these diseases are threatened. These laws give certain additional powers to the sanitary officers, such as the right of entering and taking possession of dwellings, etc.; the isolation of infected buildings or localities, the disposition of the bodies and effects of the dead from these diseases, the establishment of quarantines, etc. In cases of death from cholera, cremation or burial of the bodies of the dead in special places is required by law.

Certificates of death are required in all cases, and permission to make post-mortem examinations must be obtained before making such examinations.

Dissection is permitted under special license. No laws exist against vivisection.<sup>6</sup>

The use of coloring matter in the preparation of comestibles and beverages is also brought under the control of the Home Department. The sale of ice, not having been inspected at the time of cutting, is forbidden.

The manufacture and sale of medicines is controlled by

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6. Addresses by the Scandinavian League against Vivisection, and the Victoria Street Society for the Protection of Animals from Vivisection united with the International Association for the Total Suppression of Vivisection, have recently been presented to the Japanese Government in deprecation of the introduction of vivisection.—See *Japan Weekly Mail*, April 26th, 1884.

certain laws, relating especially to the more poisonous remedies, or to the adulteration of substances, used as medicines, for the supervision of which Government Laboratories<sup>7</sup> have been established at Tōkiyō, Yokohama, Ōsaka, and Nagasaki, where certain imported drugs and  
 371 medicines, as well as certain of those of home manufacture, which are either poisonous in their nature or are liable to be counterfeited or adulterated, together with all patent medicines, are submitted to chemical examination and analysis, and if found to be pure or, in case of patent medicines, if non-injurious, are stamped by the office as “allowed for medical use,” or permitted to be sold without the stamp.

Among the medicines requiring such stamps, may be mentioned strychnia, morphia and atropia and their compounds, santonin, ipecacuhana, digitalis, cinchona bark, extract bitter almonds, ether, chloroform, aqua ammonia, chloral hydrate, bromide and iodide of potassium, quinia and its compounds, bismuth subnitrate, citrate of iron and quinine, nitrate of silver, calomel and corrosive sublimate.

Manufacturers of medicines, as well as druggists and apothecaries, and all those who sell patent medicines, are required by law to obtain licenses for the same; and in case of the latter, a separate license or permit is necessary for each patent medicine offered for sale.

The sale of poisonous or powerful medicines, is also regulated by laws requiring, among other things, that the name of the medicine shall be plainly and clearly written *in Japanese* (and not in a foreign language alone), and the poisonous or powerful nature of the medicine denoted on a special label on each bottle, or package;

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7. Sei-yaku-ba.

and that these medicines shall only be sold under an order or prescription from a physician, apothecary, chemist or manufacturer of medicines or chemicals, stating the proposed use. In dispensing physicians' prescriptions, however, this is not required, beyond a statement from the physician to the one prescribed for, as to the poisonous nature of the ingredients of the prescription, but an exact record of all such prescriptions, as well as of all poisonous or powerful medicines dispensed or sold, is required by law to be kept by the apothecary, giving particulars as to date of each sale, the name of purchaser and prescriber.

Patent medicines are subject to a stamp duty of 10 per cent of the price at which they are sold at retail, and this price must be plainly stamped on each package.

The laws respecting the production, manufacture, and <sup>372</sup> sale of opium and its derivatives, place it entirely under the control of the Government, which purchases it from the producer and sells it at the Government Laboratories in one drachm bottles, each sealed with the official stamp.

There are also a certain number of apothecaries especially licensed to sell this medicinal opium, who are required to display in front of their respective premises, a signboard denoting the fact that opium is kept on sale. The number of these apothecaries is governed by the size of the communities for which they are so appointed. They obtain their supplies of the drug semi-annually, on estimates sent in by them to the nearest Government Laboratory, and are required to keep a register of names and addresses of persons to whom opium exceeding one drachm<sup>8</sup> in weight has been supplied, together with total

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8. Amounts of less than a drachm are put down in a separate book and the total footing and number of sales only returned.

weight sold during each half year, and also to send a copy of the same in duplicate at the close of each term, to the Local Government, which in turn forwards one copy thereof to the Home Department. Hospitals may purchase, on order from the director, amounts at one time not exceeding five ounces, and private practitioners, quantities not exceeding one ounce; both of which are required to keep records of the dispositions made thereof, which must be furnished for inspection whenever called for by the proper authorities.

No apothecary is allowed to sell opium to Japanese or foreigners except on written order of a physician, or, as stated, to hospitals, or persons who are themselves licensed to sell opium.

The price of opium is determined by the government, and varies according to the abundance and quality of the home and foreign supply. Opium sold must contain from 6 to 11 parts of morphia. The penalty for infringement of these regulations is from yen 150 to 500, the confiscation of stock, and revocation of license.

THE MEDICAL BUREAU OF THE ARMY. — The Medical Bureau of the Army Department, which was organized in 1874, at the time of the last report (1883) consisted of 252 373 medical officers, or 54 less than the full number required. There were also 228 head attendants (nurses, etc.); making in all 974 soldiers under this bureau.

The following is a list of the number, grades, and the pay of medical officers:—Director-General, yen 350 per month;<sup>9</sup> 4 Inspectors, yen 250; 7 first-class Chief-Surgeons, yen 200; 22 second-class Chief-Surgeons, yen

9. The Japanese paper yen has a value in U. S. gold varying from 60 to 85 cents. When on foreign stations an additional allowance is made.

150; 64 first-class Surgeons, yen 100; 83 second-class Surgeons, yen 60; 40 third-class Surgeons, yen 50; 9 deputy Medical Examiners, yen 45; 2 second-class Chief Apothecaries, yen 150; 5 first-class Apothecaries, yen 100; 4 Deputy Examiners in Pharmacy, yen 50; total 252, or 54 less than the full number provided for by law. Each of the six garrisons of the empire is provided with a hospital, the cost of maintaining which during the fiscal year 1883-3 was as follows: Tōkiyō, yen 70,770; Sendai, yen 9,512; Nagoya, yen 3,473; Ōsaka, yen 10,323; Hiroshima, yen 4,827; Kumamoto, yen 4,777; total yen 93,692. The amount expended for medicines during the same period was yen 32,570; the cost being yen 0.029 per day per head.

The average daily strength of the army was 39,559.36 men, and the average daily number of sick was 225.34. The total number of days of sickness was 82,240, and the daily sick rate, 5.695 per thousand. The number of deaths was 588, or 14.864 per thousand. The most prevalent diseases among the soldiers were those of the digestive organs, surgical diseases and febrile disorders. There were 1,233 cases of intermittent fever, 156 cases of cholera, 108 cases of typhoid fever, and 7,802 cases of *kakke*. In the Japanese military hospital in Korea, 1,135 cases were treated, and there were 33 deaths recorded. The cost of medicines was yen 595, or yen 0.042 per person per day. The total expense of conducting the business of the Bureau was yen 30,621.50, and the expense of the Department for ordinary expenditures, yen 8,278,144.78, and extraordinary, 1,196,083.11, making a total of yen 9,474,227.89.

The Medical Bureau of the Navy Department was

organized in 1870, and at the present time has under it  
 374 101 medical officers, whose ranks and pay are as follows:—Director-General, pay yen 300 per month; 1 first-class Inspector, yen 250; 2 second-class Inspectors, yen 150; 6 third-class Inspectors, yen 100; 20 first-class Surgeons, yen 70; 18 second-class Surgeons, yen 50; 27 third-class Surgeons, yen 40; 25 fourth-class Surgeons, yen 30.

The Bureau has two hospitals; one at Tōkiyō, established in 1871 at Takanawa, with Dr. Wheeler as surgeon (p. 345); and one at Yokosuka near Yokohama. These hospitals contain 163 and 167 beds respectively, including 44 beds for contagious diseases. The number of patients treated during one year (last reports), was 907, and the average cost per bed yen 179. The total expense of the Bureau for last year (1883), was yen 91,817; the total expense of the Department, being 3,000,000 yen for the same period, the number of officers and men in the Navy during the same year, was 4,935.<sup>10</sup> The present Director-General is Kanehiro Takaki F. R. C. S. Eng.<sup>11</sup>

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10. In the General Report on the Diseases and Injuries of the Mariners in the Japanese Navy (1883), published in the Transactions of the *Sei-I-Kwai* (see Societies) No. 37, 1885, the following statements relative to sickness appear:—Total number of cases during year, 15,803; cured, 15,376; invalided, 26; died, 85; remaining at end of year, 316. From the same report it appears that of the above number of cases, 1292 were *Kakke* (beri beri) with 49 deaths. There were 1466 ophthalmic cases, 3672 cases of diseases of the respiratory system, 4093 cases of disease of the digestive system, and 1785 injuries. The ratios of the sick per thousand was 32.035; the number of days of sickness, 20,6861; the average number of sick, daily per 1000, 114.87; the average duration of treatment, 13,089 days; and the death rate, 7.23 per 1000. The total number of mariners in the service was 4633. An interesting "Report on *Kakke* in the Navy in its relation to Food," by Surgeon-General Takaki,

SCHOOLS, COLLEGES, HOSPITALS, ETC.—According to a 375 recent report there are 31 medical schools established by the prefectural governments, and also a few that are self-supporting. The hospitals established by the prefectural governments number 350, of which 221 are general hospitals, 124 venereal, 2 insanity, 1 lepra, 1 ophthalmic, and 1 institute of vaccination. There are also 294 self-supporting hospitals, of which 266 are general (including one charity hospital), 6 venereal, 5 *kakke* (beri-beri), 4 lepra, and 8 ophthalmic hospitals; also 1 lying-in, 1 fracture and dislocation, and 1 surgical general hospital. The Army Department has 6 hospitals and 14 sick-quarters; the Navy, 2 hospitals, and the Medical Faculty of the University of Tōkiyō, one main hospital and one branch establishment under its supervision. There are also sick-quarters connected with each of the large prisons throughout the country. The principal medical college in the empire is the Department of Medicine of the University of Tōkiyō. A historical sketch of this institution from its foundation has been already given (p.342). The course of instruction in this department is modelled after that of the German colleges; and the foreign pro-

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will be found in the Catalogue of the Exhibits sent by the Japanese Sanitary Bureau to the International Health Exhibition, London, 1885, in which the conclusion is drawn, that this disease "is in great measure due to unwholesome or insufficient nutriment, or from improper apportionment of food."

11. Dr. Takaki spent a number of years in study in England where he at one time held the posts of House Surgeon and Accoucheur at St. Thomas's Hospital, London; and where he obtained the Cheselden Medal for Surgery and Surgical Anatomy and the Treasurer's Gold Medal for general proficiency and good conduct. He passed successfully the examination of the Royal College of Surgeons for membership, and in 1880 became a Fellow of the same body by examination.

fessors, of whom there are at present five, are also German. The main course covers a period of four years; and the preparatory course, three years more. There is also a course of lectures delivered in the vernacular, which is called the special course. This is the only body in Japan which bestows the degree of *I-gaku-shi*, or Master of Medicine, upon its graduates. According to a recent report, the number of graduates from the establishment of the Department to 1882, who have received this degree, is 151, while 389 have received the certificate of accomplishment of the special course, and 178 have been graduated in pharmacy. The total number of students in attendance in both courses is 972, and in the course on pharmacy, 89. Dr Miyake is the present director.<sup>12</sup>

376 Provincial medical schools, as already stated, have been established in nearly every prefecture of the empire. The course of instruction in these schools varies in length from two to four years. The medical works employed in many of these schools are in English or translations from the English or German. Although there is still a large number of physicians practising after the old style, there are very few schools of Chinese medicine. The principal hospital of the empire is that of the University at Tōkiyō. It is constructed of stone and plaster, in pavilions, and in foreign style. The patients usually lie on beds rather than on the mats, as in their homes, and

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12. The following are the names of the foreign professors now connected with the University:—Dr. Groth, German and Latin languages; Dr. T. P. Eykman, Chemistry, Pharmacy and Pharmacology; Dr. F. Disse, Anatomy; and Dr. Scriba, General and Special Surgical Clinic, Ophthalmology, etc.; Dr. Erwin Baelz, General and Special Pathology, Therapeutics and bedside clinic; M. R. Lange, German and Latin, etc.



the hospital compares most favourably with similar institutions at home. The following, from the Seventh Annual Report, will give an idea of the work done at the hospital. Medical and surgical clinics are held by native and foreign professors on every other day or oftener. Ophthalmic clinic, held daily by native physicians and by the foreign physicians three times a week. The number of out-patients treated during the year was 6,320, and of in-patients 1,157. There were four post-mortem examinations made during the year, two of females. There are some free beds in this hospital. The expense of in-patients varies from 25 sen per day to a yen or more.

The hospitals in the interior are mostly of wood and plaster; there have, however, been some built of brick or stone.

The largest free hospital in Japan is the Tōkiyō Charity Hospital, which was founded in 1882, with Drs. Totsuka, Inspector General of Hospitals, and Drs. Takaki, Surgeon-Major, both of H. I. J. M.'s Navy, as promoters. It is capable of accommodating over a hundred patients, and according to the last report, the number of patients treated during 1882-4 was 691; the number of days spent by patients in the hospital, 12,621; number of outdoor patients, 1,981; and the number of days on which they received treatment, 38,824; number of members of the Society, 273, and amount of capital, 63,150 yen.

**MEDICAL SOCIETIES.**—The Medical Societies of Japan may be divided into two classes—educational and charitable. Under the head of educational, may be classed the purely medical, the sanitary and certain scientific societies. According to a table furnished the writer by

the *Tōkiyō Iji Shinshi*, or Tōkiyō Medical Journal, the number of purely medical societies is eighteen, of which 377 five are established in Tōkiyō, two at Ōsaka, two at Kiyōto, and one in each of the following prefectures:—Chiba, Wakayama, Fukushima, Aichi, Hiroshima, Shidzuoka, Hiyōgo and and Sakai.

The membership of these several societies numbers from twenty to three or four hundred each, and the average number of meetings annually, from 10 to 50. All of these societies, with one or two exceptions, have for their object the advancement of Western medical science and practice of medicine in Japan. The principal societies of the Capital are: the *Ko-I-Kuwai*, *Sei-I-Kuwai*, *Ho-Gen-Kuwai*, the *Tōkiyō-I-Gaku-Kuwai* and the *On-Chi-Shu*, to which may be added the *Tōkiyō-I-in-Kuwai*, a society of Chinese educated physicians, mentioned by Mr. Mayet in his interesting paper on "Japanese Societies in Tōkiyō."<sup>13</sup>

Several of these societies publish transactions monthly, or bimonthly. The *Ko-I-Kuwai*, of which Iwasa Jun is the president, is one of these, and the *Sei-I-Kuwai*, another. The latter society, according to the statement in a recent number of its Transactions,<sup>14</sup> "was founded in January of 1881, having for its general object, as its name signifies, the advancement of medical science in Japan, and also the establishment of a Medical Museum and Library, and the erection of a building for the same, equipped with apparatus, etc., for the purposes of the society.

"Since its foundation and up to the present time there have been held one hundred and fifty-eight meetings, in

13. Read before the German Asiatic Society of Japan, Dec. 20th, 1882. Also Translation of the same in the *Chrysanthemum*, No. 5, Vol. 3.

14. *Sei-I-Kuwai* Trans. No. 36.

which one hundred and thirty-one clinical cases were exhibited, some of which were very interesting and instructive. The meetings are held on Wednesdays between 7 and 9 p.m.; and at the ordinary meetings, reports on clinical cases are made, lectures given, and some interesting points in foreign medical papers read. Discussions take place on clinical cases, which are exhibited half an hour prior to the opening of the meetings. A special discussion takes place once a month upon a certain subject selected a month in advance. A novel feature is the monthly English meeting, at which the discussions are conducted entirely in the English language. The society<sup>378</sup> at first consisted of only twenty-two members, but now its members are eighty-six in number, including nine foreign members."

The president of this society is Takaki Kanehiro, F.R.C.S., Surgeon Director-General of the Japanese Navy. Of the five members of the Council, one is a foreigner. The Society has recently purchased a commodious building in Kiyōbashi-ku for library purposes. It publishes its transactions monthly in a journal of over 60 pages, from eight to twelve of which are in English.<sup>15</sup>

The principal society of physicians of the Chinese School, is the *On-Chi-Sha*, of which Asada Sōhaku, one of the foremost physicians of this school, is president.

Besides these societies devoted to medicine, there are two sanitary or hygienic societies. The larger of these, the Japanese Society of Health, "owes its origin to the efforts of a few gentlemen, mostly physicians, who, feeling the necessity for the more general diffusion of sanitary

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15. An interesting article relating to this Society appeared in the *Japan Daily Mail* of January 9th, 1885.

knowledge in Japan, were led to adopt this as the most feasible plan of carrying out the purpose. The first meeting of the Association was held in May, 1883, when the number of members was 1,426. Meetings have since been held on the last Saturday of each month, at which four or five addresses, bearing upon public and personal hygiene, have been usually delivered. Reports of these addresses have been sent to all the members. According to a recent report, it appears that during the remaining months of the first year of its existence, the number of members increased to 4,514, and over twenty branch societies were formed in the provinces. The membership, a short time since, was reported at 5,620. The Regulations of the Association have been published in English. The following is a list of the promoters:—Messrs. Adachi, Hijikata, Hasegawa, Hosokawa, Ikeda, Ishiguro, Kabayama, Kagawa, Kuki, Matsumoto, Matsuyama, Mitsuma, Miyake, Nagayo, Sano, Shinagawa, Shirane, Takaki, Tashiro, Totsuka, Utsunomiya, Watanabe and Yoshikawa.”  
—*Trans. Sei-I-Kuwai.*

The *Ri-I-gaku-Ko-dan-Kuwai*, or, Scientific and Medical Lecture course, is, delivered by professors of the University of Tōkiyō. Its object is to popularize science and  
379 medicine. The first meeting took place in May, 1884, at which the attendance was over 1200. The lectures delivered on this occasion were by Dr. Ōsawa, on the *fugu*, or *tetrodon* poisoning, and by Mr. Yamakawa on the electrical machine.

The principal charitable medical societies are the Haku-Ai-Sha, or Red Cross Society of Japan; the Do-Ai-Sha, or Neighborly Love Society, the *Raku-zen-Kuwai*, or

Benevolent Society, mentioned by Mr. Mayet,<sup>16</sup> and the *Fujin-Ji-sen-Kuwai*, or Ladies' Benevolent Society.

The *Haku-Ai-Sha*, literally, Society of Universal Love, according to a recent statement,<sup>17</sup> was founded by Sano Tsunetami during the Saigō rebellion, with the object, in common with the Society of the Red Cross of Europe, of caring for the wounded in times of war. The *Do-Ai-Sha* was founded at Tōkiyō, in 1879, with the object of providing free medical treatment for those who are too poor to pay for it. It also has in view the establishment of a free hospital. The work of the Society is supported by voluntary contributions.

The contributors are of two classes; those who contribute money, and those (physicians) who give their services. In the first class are those who contribute lump sums, and those who agree to purchase a certain number of tickets for medicines. The physicians, who constitute the second class, agree to give treatment free to a certain number of patients within their respective districts daily, the medicine being paid for by the society at a certain fixed rate. These physicians display a large sign in front of their doors on which are written the words "*Do-Ai-Sha*." The tickets can be purchased from the society at five sen per ticket; and each is good for medicine for one person for one day, at the office of the physician of the district in which the patient resides. The tickets may be distributed by the members themselves, or given to the ward medical officers for distribution. Two-fifths of the price of each ticket is retained by the society for working expenses, and the remaining

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16. See page 377, note 13.

17. Kindly furnished the writer by H. E. Sano Tsunetami.

three-fifths, or three sen, is handed over to the physician who treats the case.

380 The last report<sup>18</sup> states that during the six years of its existence the society has given medical treatment to over 5,000 patients. The number of members, according to the same report, who contribute money is 239, of which number 48 are physicians. The number of physicians who give free treatment is 56.

According to Mr. Mayet's paper above referred to, "the *Raku-sen-Kuivai*, or Benevolent Society for personal satisfaction, one of the fruits of which is the Blind and Dumb Institute in Tsukiji, Tōkiyō, rejoices in the patronage of the Emperor and Empress, and numbers among its members the élite of the Japanese highest classes."

The Society of the Tōkiyō Charity Hospital should also be mentioned here, the contributions of which, as already stated (p 371), amount in the aggregate to nearly 70,000 yen.

The *Fujin-Ji-sen-Kuivai*, or Ladies' Benevolent Society, of which Countess Ōyama is president, numbers among its members many ladies of the highest rank, and has during the past year rendered great assistance to the Charity Hospital, to which it donated, a short time since, over 5,000 yen, the proceeds from a bazaar held in June last.

MEDICAL MISSIONS.—As one of the great levers in opening the way in Japan for the introduction of Western medicine and Western civilization, the efforts of the medical missionary deserve, perhaps, more than passing

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18. The writer is indebted to Dr. Takamatsu Rioan, president, for the reports of the society from which the above information has been obtained.

notice. Mention has already been made of some of the work in various localities by this class of medical men; and it now remains for us to consider the condition of medical missions in Japan at the present day. In order, however, that the facts concerning the past history of this branch of medical teaching may appear together, it will be necessary to refer briefly here to some of the events mentioned in previous chapters.

According to ancient records, medical priests practised the art of healing at as early a date as the beginning of the seventh century, A. D.; but it is not mentioned that any foreign priest entered this country as a medical missionary at that time.

The first Western medical missionaries in Japan were probably those who accompanied hither Futen (Frøez) and 381 Urugan (Organtin) in the middle of the sixteenth century. The result of the efforts of these men and their successors, in establishing botanical gardens, hospitals, and dispensaries, has already been recorded (pp. 307-310), and calls for no further comment, save to note the fact that their knowledge of the art of medicine was a most powerful aid to them in popularizing the religion they taught.

After the Portuguese, and if we except the Russian mission in Hakodate in 1858, the first Protestant medical missionary in Japan was Dr. J. C. Hepburn, who, as already stated, arrived at Kanagawa (Yokohama) in the autumn of 1859. The labors of Dr. Hepburn during the past twenty-five years, as a physician, as a student of Japanese, and as a missionary of the Cross, do not call for any tribute of praise from us, for a life filled, as his has been, with good deeds speaks for itself, and has

made him universally respected wherever his name is known.

In 1859, Dr. D. B. Simmons arrived at Kanagawa as a missionary of the Dutch Reformed Church of America, but a year later resigned this commission and took up private practice.

In 1860, Dr. E. Schmidt, of the American Episcopal Church, who was the first medical missionary at Nagasaki, opened a dispensary at that port, but on account of ill health, was obliged to return home in the following year.

In 1872, Dr. J. C. Berry, of the American Board of Commissioners for Foreign Missions, who was the first medical missionary to give instruction to the Japanese at Kōbe, arrived at that port, and soon after, became director of the Government Hospital. He also assisted in the establishment of a number of dispensaries and a hospital, within a radius of twenty miles from Kōbe. Some years later he removed to Okayama, where he has been since connected with the Government Hospital of that city.

In 1874, Dr. Faulds, of the Scotch Missionary Society, established the Tsukiji Hospital, where the Lister's anti-septic system and the treatment of fevers by the exclusive milk diet, were first introduced in Japan. A course of lectures on midwifery by Mrs. Chaplin-Ayrton, M.D., Paris, was given at this hospital in 1875.

In 1874, Dr. Macdonald, of the Canadian Methodist <sup>382</sup> Church, opened a dispensary at Shizuoka, and in the same year Dr. Palm founded a hospital at Niigata, where he was for some time assisted by Miss Shaw, now at Ōsaka in charge of the nursing at St. Barnabas' Hospital.

The number of missionary physicians and nurses now



in Japan is nine: four in Tōkiyō, three in Ōsaka, one in Okayama, and one in Kanazawa, the latter being a lady (Dr. Porter). The medical work of these missionaries includes two hospitals (one at Tōkiyō, the Tsukiji Hospital with 10 beds, and one at Ōsaka, St. Barnabas' Hospital with 24 beds) and five dispensaries.

To this number it is proposed to add a large hospital and medical school at Kiyōto or Ōsaka, with a staff of foreign professors, under the *Dō-shū-sha*, a native Christian college, and another hospital at Tōkiyō under the Episcopal Church of America, the latter to contain 60 beds. A memorial hospital and training school for nurses, at Tōkiyō, has also been proposed.

MEDICAL LITERATURE AND LIBRARIES.—The medical literature of Japan may for the sake of convenience be classified under the following heads: History of Medicine; Chinese and Japanese Medicine; Western Medicine; Medical Periodicals; and Foreign Literature.

Medical history finds a place in nearly all the histories of Japan, more specially those which include the earlier records of the country. Asada Sōhaku in the *Mei-i-den* (p. 257) gives a list of 322 works, mostly histories, which contain historical sketches relating to medicine. Among the books thus referred to, mention of some of which has already been made, are to be found the *Ko-ji-ki*, *Ni-hon-sho-ki*, or *Ni-hon-gi*, *Ni-hon-ki-riyaku*, *Hon-sō-wa-miyō-den-sho*. Some of the books in this list are purely medical, such as the *Ko-chō-i-shi* (古朝醫史), Japanese Medical History, and *Hon-chō-i-kō* (本朝醫考), Reflections on Japanese Medicine, while others are of a secular nature, yet include numerous references to the condition of medical affairs in ancient times. The *Shin-dai-ki*, or

the *Shin-dai-no-maki* of the *Ni-hon-gi*, is an example of such a work. In more recent times, several histories have been written to which reference has already been made, such as the *Dai-ni-hon-i-dō-yen-kaku-kō* (p. 243), or, Reflections on the History of Japanese Medicine, and *Ko-i-dō-yen-kaku-kō*, Reflections on ancient Medicine. The  
 383 most complete, perhaps, of the recent histories of medicine is that of Kaku Kashiro, entitled *Kō-koku-i-jī-yen-kaku-shō-shi*, from which frequent quotations have been made. As a valuable contribution to medical history, should be mentioned, the *Kō-koku-mei-i-den* (p. 245), or, Biographical Dictionary of Famous Japanese Physicians, by Asada, which contains short biographies of 268 persons.

Under the head of Chinese and ancient Japanese medical works, may be placed all those works written by Chinese upon the subject of medicine, and read in Japan, and all that have been written by Japanese up to the beginning of the sixteenth century, and also many that have been written since. Among these are the *So-mon*, *Hon-zō*, *Rei-sū*, and *Wa-sai-hō*. The Department of Education has furnished the writer, through the kindness of His Excellency Tanaka Fujimaro, with a list of the more important Chinese and Japanese medical works, 44 in number, nearly all which have been mentioned in the references to the 217 medical works made in this paper.

From this list and the catalogues of medical works contained in the libraries of Dr. Asada Sōhaku, the Medical Department of the University, and the Tōkiyō Museum, Uyenō, and in the To-sho-kuwan, or Tōkiyō Library, the writer has compiled a list of Chinese and Japanese medical works, comprising over sixteen hundred names, with date and subject of each publication, toge-

ther with the author's name, and the number of volumes included in each work. This list will be found appended to this paper.

The works in Japanese upon Western medicine and allied sciences, are, for the most part, translations or compilations from foreign writers. A list of 67 such works used in the government schools, contains not a few familiar names, such as Barker and Quackenbos on natural philosophy; Roscoe and Fresenius on chemistry; Smith and Gray on anatomy; Herman, Becker and Huxley on physiology; Niemayer, on the practice of medicine, and Loomis on diagnosis. The catalogue of Maruya & Co., the largest firm of booksellers in Tōkiyō, gives the following number of medical works on each of the subjects mentioned below: chemistry, 54; anatomy, 36; physiology 36; pharmacy, 61; practice of medicine, 13; diagnosis, 22; surgery 41; obstetrics and gynaecology, 14; children's diseases, 24; sanitation and hygiene, 384 44; ophthalmology, 13; otology, 1; dentistry 4; specialties, 45; dictionaries, 6; medical jurisprudence, 10; veterinary medicine, 11; miscellaneous medical works, 57.

Under this head should also be mentioned the medical publications of the Army and Navy, and Home Departments.

The two former publish annually the elaborate reports of their respective medical bureaux, while the latter publishes an annual report in Japanese and English of the Sanitary Bureau, also statistical tables, special cholera reports, and the Sanitary Journal.<sup>19</sup> Reports of contagious

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19. The following is a list of publications of the Sanitary Bureau:—Sanitary Journal Nos. 1-38 incl.; Notifications of the Sanitary Bureau; 1-40; Annual Reports of the Sanitary Bureau, 1 and 2, 3, 4, 5 (Japanese). The same in English, 1 and 2, 3, 4. Reports on Epidemic Cholera,

and infectious diseases are published weekly,<sup>20</sup> and reports of deaths by poisoning, etc., semi-annually.

According to a list furnished by the Department of Education, there are ten periodicals devoted to medicine, pharmacy and public health, which have a total circulation of about 4000 copies. Of those devoted to medicine, the *Tōkiyō I-ji Shinshi*, or Tōkiyō Medical Journal, the *I-ji Shimbun*, or Medical News, the *Sei-I-Kuwai-Geppō*, or Monthly Journal of the *Sei-I-Kuwai*, and the *Chiu-gai I-ji Shimbun*, or, Japanese and Foreign Medical News, 385 have the largest circulation; that of the *I-ji Shinshi* being 1800 weekly, and the *Chiu-gai I-ji Shinshi*, 2500 bi-weekly. The *Sei-I-Kuwai-Geppō* has a monthly circulation of nearly 700 copies, and has an English Supplement of 12 pages.

These journals are all ably edited, and contain government notifications, original articles, translations from

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1877; ditto 1879; ditto Supplement; ditto 1877 (English). Statistical Tables on Exhibition, 1879, at the Second National Industrial Exhibition of Japan, by the Sanitary Bureau, 1881. The same in English. Notes on clothing materials, etc.; Statistics of Births, Marriages and Deaths in cities and towns (partially translated), 1880. Descriptive Catalogue of the Exhibits of the Sanitary Bureau of Japanese Home Department at the International Health Exhibition, London, 1884.

20. The report for the last week of December, 1881, gives the following:—

Disease.	New cases.	Deaths.	Since Jan. 1st.	
			New cases.	Deaths.
Cholera .....	—	1	919	419
Typhoid fever .....	207	79	21,813	5,251
Dysentery .....	81	62	23,095	5,787
Diphtheria .....	20	13	2,026	1,096
Typhus .....	2	2	1,147	240
Small-pox .....	39	6	1,297	299
Total .....	349	136	50,297	13,092

foreign journals, and reports of bureaux, hospitals and schools. They are printed on good paper, with movable type; are usually post 8vo in size, and contain from thirty to sixty pages of printed matter, with occasional engravings. Advertisements seem to occupy a rather smaller proportion of space than is usually devoted to them in foreign journals. The price averages 10 sen per copy.

Of the remaining journals above mentioned, three are devoted to pharmacy, and one—the Journal of the Sanitary Bureau—to sanitary affairs. The press laws of Japan require the registration of all periodicals, and with certain exceptions, the deposit of security to the extent of over 500 yen. The exception has been made in favor of purely scientific journals. It is perhaps worthy of note, that every work, whether medical or of other character, must receive government authorization before being published, and if a translation, the name of the author must appear on the title page.

A few years ago the Central Sanitary Bureau undertook to compile a new pharmacopæia based upon modern medicine. Several Japanese and foreigners were engaged, and it is now already written out in German, and is soon to be published in Japanese and Latin. It is stated upon the authority of one of the committee, that it will, for the most part, follow the German Pharmacopæia, Japanese remedies, however, being employed wherever their merits have been fully tested.

Foreign medical literature relating to Japan will be found principally in the writings of Wilhelm ten Rhyne, Kaempfer, Mohnike, Siebold, Hoffmann, Wernich, Hilgen-dorf, Geerts, Simmons, Scheube, Baelz, Anderson, Eld-

ridge, Faulds, Taylor and Berry, a list of which writings, so far as ascertainable, will be found in the appendix.

The principal medical library of Tōkiyō, and perhaps of the Empire, is that of the Medical Department of the University, which contains 467 Chinese and Japanese works, comprising 2,274 volumes and nearly 9,000 volumes of foreign works. Many of the latter, it should be stated, are text books, and are for the use of students. The  
 386 actual number of separate works, therefore, must be much less. The library of Dr. Asada Sōhaku contains 478 separate works, comprising 1,677 volumes, of which number of works he is himself the author of 24. The Tōkiyō Library, Soto Kanda, contains 58 medical works in 454 volumes; and the Museum at Uyeno, one hundred medical works more. Besides these libraries, there are many smaller ones in the possession of physicians of the Chinese school.

An effort has recently been made by the Society for the Advancement of Medical Science in Japan, to found a Medical Library for the benefit of the profession and the students of Tōkiyō. A suitable building has been purchased, and several hundred volumes have already been received. It is known as the Tōkiyō Medical Library.

MEDICAL PRACTICE—Very little beyond brief notes in books of travel, has been written upon the subject of medical practice in Japan at the present day. Of the methods, manners and customs of the physicians of earlier times, however, several most interesting sketches have been given us. Kaempfer, Siebold and Hoffmann have each contributed valuable papers. The latter, Dr. Hoffmann, late Professor in the Medical Department of the University, in the Transactions of the German Asiatic

Society (pt. 1, 1873), gives a description of the state of medical affairs, as he found it over twelve years ago, and before the practice of Western medicine became as general as at present. The establishment of numerous medical schools, together with the promulgation of the regulations making it necessary for every physician to be provided with a license to practise (which, with certain exceptions is only obtainable upon passing examinations in the principal branches of Western medicine), has made a great change in the general character of medical practice, as well as the social standing of the physician, and is tending to bring about a state of affairs such as now exists in Western countries. The following from a special report of the Sanitary Bureau, shows the relative numbers of individuals connected with the practice of medicine in Japan:—Total number of physicians and surgeons, 38,609; of which 2,438 have passed the government examination, and a number have yet to pass. Of the remainder 31,766 were in practice before 1876, and have received licenses without examination. Besides these, there are 646 oculists, and 119, whose specialty is the diseases of the mouth. There are 3,576 medical students in the Medical Department of the University, the prefectural and the principal private medical schools. There are 201 apothecaries who have passed the Government examinations, and 8,316 who were in business before the enforcement of laws requiring the examination of those licensed to dispense medicines. It will be seen from these statistics, that the proportion of physicians who have not passed an examination is very large, yet it should be borne in mind that many of these have long studied and practiced medicine according to Western methods.

Generally speaking, the physicians of day may be divided into two schools: those of the Old School, who practise according to the ancient Chinese theories, and those of the New School, who follow the principles of medicine as taught in the West. Strictly speaking, however, the larger number of physicians in the smaller cities and towns are eclectic in their practice, following the teachings of both schools. The tendency of this class is from necessity toward the New School. The physicians of the Old, or Chinese School, who follow religiously the teachings of the ancients, are comparatively few in number, yet within their ranks are to be found some most successful physicians. Foremost among these, is Asada Sōhaku, one of the court physicians, and a man of wonderful genius.<sup>21</sup>

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21. According to Imamura Riyō, in the Biographical Dictionary of Famous Physicians, Asada was born in Shinano, and is a descendant of a retainer who was in the service of Minamoto no Yoshinaka. An ancestor of Asada was lord of the castle called Asada Jō, in Shinano, from which the family name was derived. Medicine became the profession of the family from the time of the grandfather of the subject of this sketch. At the early age of 13, Asada Sōhaku began the study of medicine, and soon distinguished himself as a student of unusual ability. He went to Kiyōto when eighteen, and studied under the old Chinese physicians of that city. At 22, he resolved to seek his fortune in Yedo, and although poor and with but few friends in this great city, he persevered until, at the age of 40, he had obtained a wide reputation for his skill and learning. During the year 1858, when an epidemic raged, he had 2,993 patients under his care at different times. In 1861 he was presented to the Shōgun. In 1865, the biographer states, the French Minister Roches, who had suffered from a disease which had for a number of years baffled all medical skill, applied to the Shōgun for the advice of one of the most skilful of the physicians of this country; whereupon Asada was ordered to attend him, and succeeded in restoring him to health. In 1866, when the Shōgun, who was then in Ōsaka, was taken ill, Asada was sent for,



The ranks of this school are gradually being reduced, 388 and, in all probability, within a few years, the Chinese school of medicine in Japan will have ceased to exist. The *Kuwam-pō-no isha*, or Chinese educated physicians, as they are called, always dispense their own medicine, which, as has already been stated,<sup>22</sup> consist for the most part of herbs, and a few mineral substances, as mercury and lime. These medicines are usually dispensed in the form of coarse powders, with which decoctions are made by the patient. The fees are usually given to the carriage or *jinrikisha* coolies, when a call is made at the house of the patient; but as a rule, the fee is included in the price of the medicine, which ranges from five to ten sen per day.

Although, among the most conservative of the higher classes, as well as among the lower and ignorant classes, the Chinese physicians are still very popular, the superiority of Western medicine is rapidly becoming apparent to all.

Among the physicians of the New School, many have become eminent. The names of some of these in Tōkiyō are: Matsumoto, Ikeda, Hashimoto, Miyake, Sasaki, Satō, Takaki, Tōtsuka, Shimidzu, Mume, Harada, Kaga and Ōsawa.

Western surgery seems to have attracted many students and diagnosed the affection to be *kakke*. In 1871, when an American College applied to Japan for native medical works, the Medical Department sent, among others, the *Kō-koku-mei-i-den* (p. 33) by Asada, who is also the author of more than twenty other works, principally upon Chinese medicine. He is credited with saying that, "the *Kon-gō*, or Confucian Analects (p. 269) will establish character; while the *Shō-kan-ron*, or Treatise on Colds and Fevers, will save life" (p. 319).

22. See pp 250, 256-7, 284 297, 500 and 313.

among the Japanese by the brilliancy of its results, and not a few Japanese surgeons have attained to great skill in this branch of science. A short time ago four ovariotomies, with three recoveries, were reported by Dr. Takaki of the Charity Hospital, and other surgeons have successfully performed operations considered to be most difficult. Indeed, the Japanese give promise of becoming most skilful surgeons. In medicine, much progress has been made, and efforts are being put forth by many, to keep fully up with the advance of science in other countries.

- 389 Among the specialists, there are some very skilful men, especially the oculists. The leading oculists of the Capital are Drs. Inouye, Itō, Ume, Kiribuchi, and Andō. The former of these has a practice amounting to over 200 cases daily, and others have also large practices. Many of these keep fully abreast with the times, and use the latest Western remedies, such drugs as jequirty, homatropin, and cocaine having already been employed in the treatment of ophthalmic diseases by several of the leading specialists.

The Japanese are excellent dentists, as many a foreigner can testify from experience. The most successful dentists of the Capital are those who have received foreign instruction, but there are many still practising according to the old methods. The orthodox sign of a string of artificial teeth is no uncommon sight on the streets of Tōkiyō, and on the great thoroughfares may often be seen the peripatetic dentist, who during the frequent lulls in business usually entertains the passers-by with exhibitions of sword practise, etc., whilst an immense pile of teeth at hand testifies as to the number of patients already relieved.<sup>23</sup>

Although in ancient times, women were allowed to practise medicine, there have been none who have followed the art for several centuries past. Recently, it is stated, one Okada Misu applied for permission to be examined for the license to practise medicine.

With the physicians of the New School, as with those of the Old School. it has been the custom to include the fee in the price of the medicine; but there is a growing tendency toward fixed fees, and it is fast becoming the fashion to write prescriptions to be filled by the licensed apothecaries.

The value of the practice of any one of the more 390 popular physicians of the Capital is quite considerable, and amounts to as much as \$ 800 per month in one or two instances, although it is probable that the average income of a fairly successful physician is not equal to more than \$100 per month.

Physicians in Japan are classed, as in Western countries,

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23. The following, from the *Japan Herald*, goes to show that Japanese, even before the introduction of Western science into Japan, were far ahead of their neighbors the Chinese in mechanical ingenuity.

“At a recent meeting of the Odontological Society of London, Dr. Elliott exhibited and presented to the museum some very curious artificial dentures of Japanese manufacture. The Japanese had derived most of their technical and scientific knowledge from the Chinese, but, in this matter, they were far in advance of their teachers; for, whilst the latter could only carve a row of incisors and fasten them to the teeth on either side, the Japanese could make thoroughly serviceable dentures and had been acquainted with the method of fixing them by suction for about two hundred years. The teeth were mounted on hard wood, those in front being made from quartz pebbles carefully ground down, but the process of mastication was performed by copper nails, which occupied the place of the molars. One of the dentures exhibited had been in use for fifteen years. Dr. Elliott gave a very interesting account of the way in which they were made and fitted.”

with the priests and lawyers, but the profession, as a whole, stands perhaps somewhat higher socially, and many of its representatives now, as in olden times, hold important positions at court and under the government. The possession of a knowledge of the Western sciences, now required of every applicant for the official license to practise medicine, and the growing indifference toward the Buddhist and Shintō religions, tends to raise the relative social rank of the physician above that of the priest.

CONCLUDING REMARKS.—As a suggestive, and perhaps fitting, commentary upon the subject of the foregoing sketch of medical progress in Japan, the following comparative table has been arranged of the principal events connected with, or affecting the progress of, medicine in Japan and China, and in the West.

JAPANESE AND CHINESE.<sup>24</sup>

- Emperor Shin-nō (*Shin-nun*), to whom Chinese tradition ascribes the earliest writings on medical art (the *Hon-sō*) ... . B.C. 2737
- Emperor Kō, or Kō-tei (*Hwang Ti*), according to Chinese tradition the first to teach acupuncture, and theory of the *Yin* and *Yō*. . . . . B.C. 2697-2597
- Ō-na-muchi-no-mikoto, according to Japanese tradition the first to teach the art of medicine in Japan about... . 1600
- Emperor Jimmu, the last ruler of the *Shindai* or "Divine Age" of Japanese history, and the first ruler of the *jin-dai* or present age, ascended the throne . B.C. 660
- Confucius*, born . . . . . B.C. 551
- Hsu Jaku Pien Chiao*, a celebrated Chinese physician, author of the *Nai Kyo* ..... B.C. 5th-4th c.
- A Chinese physician (*Jo Fuku*) with a colony said to have crossed over to Japan ... B.C. 218-214

WESTERN.<sup>25</sup>

- Abraham . . . . . B.C. 20th c.
- Alleged beginning of Chaldean astronomical observations sent by Callisthenes to Aristotle... 2234
- Egyptian Monarchy founded ... 2188
- Moses born . . . . . 1577
- Athens founded ..... 1556
- Letters brought into Greece... 1493
- Chiron, the Centaur (Greek Mythology) ..... 12th c.

24. Except when otherwise stated, the events mentioned in the left hand column refers to Japanese history. Titles of books and Chinese proper names are written in italics.

25. The following brief notes on the principal events of medical history up to the close of the 18th century, have been taken from the *Encyclopædia Britannica*, Chamber's *Encyclopædia*, the *New American Encyclopædia*, and from *Dunghison's History of Medicine* and *Macdonald's Historical Sketch of Medicine from the Earliest Times*. A few events from general history have been inserted on account of the influence they have exerted upon the progress of science, and consequent indirect relation with the subject.

Whitney:—History of Medical Progress in Japan. 193

- Period of so-called pure Japanese medicine, said to have terminated between ..... B.C. 200 & 90
- An ambassador from Korea arrived in Japan ..... B.C. 33
- Small-pox known in China (Wylie) ..... A.D. 2nd c.
- Japanese military raid upon Korea ..... A.D. 11
- Chō-Chiu-kei*, or *Chiu-kei*, a celebrated Chinese physician, the author of the *Kin-ki* and *Shō-kanron*, whose teachings have formed the basis of all the ancient schools of medicine of China and Japan, flourished ..  
..... *Tung To Han dy.* 25-221
- Invasion of Korea by Empress Jingō ..... 201
- Sō Kō*, a noted Chinese physician, wrote the *Somon*, the first authority in ancient Chinese medicine ..... 221-264
- The *Ron-go*, or Confucian Analects, brought over to Japan ... 283
- Miyaku kiyō* or *Mih king*, the celebrated treatise on the pulse, written by the Chinese *Wang Shuh-hō* ..... 3rd c.
- Two Korean physicians summoned to treat the Emperor Inkiyō, arrived in Japan ..... 413
- Chinese physicians said to be familiar with anæsthesia produced by means of hemp in the ... 4th c.
- First post-mortem recorded in Japanese history ..... 459-479
- Korean physicians and botanists arrived in Japan ..... 553
- Period during which Chinese medicine flourished ..... 553-1156
- Buddhism introduced from Korea ..... 553
- First recorded epidemic of measles ..... 586
- Priests began to practise medicine 593
- Bureau for the distribution of medicines and food to the poor, first established ..... 600-622
- Small-pox said to have been introduced from Korea ..... 670
- Establishment of the first University of Medicine ..... 670
- Esculapius, God of Physic of Greek Mythology ..... 12th c.
- Venesection first practised ..... 1192
- Asclepiadæ, descendants of Esculapius practised ... B.C. 12th c.-4c. 391
- Rome founded ..... 753
- Alcmæon, the first comparative anatomist ..... 6th c.
- Hippocrates, the father of rational medicine, held that the body itself is composed of 4 elements differently combined in different individuals, and derived from them, the 4 humors of the body, blood, phlegm, bile and black bile, from which again are derived the 4 temperaments; disease consists in the disordered condition of the fluids; an influence termed nature influences every part of the human frame and superintends all its actions ..... 460-357
- Plato and Aristotle ..... 429-322
- Praxagoras, the last of the Asclepiadæ ... ..... 4th. c.
- Dogmatists and Rationalists the prevailing schools. The Dogmatists held that in order to treat disease, the physician must be acquainted with the causes of disease, and with the physiological processes of the body. They also held the fluids to be the prime seat of disease ..... 320
- Medical school founded at Alexandria ..... 320
- Dissection practised on the bodies of criminals by Herophilus and Erasistratus ..... 300-260
- The heart believed to be the origin of nerves and arteries, but arteries were supposed to contain air ..... 300-260
- School of the Empirics said to have been founded by Philinis, who held observation and experience to be the only safe guide in the treatment of disease ..... 3rd. c.
- Xenophon of Cos, flourished ... 250

- sity and medical College in Japan ..... 700
- The *Kō-ji-ki*, the earliest authentic connected record of ancient Japanese matters extant, completed ..... 712
- 392 First medical dispensary established ..... 730
- Severe epidemic of Small-pox .. 735
- The art of surgery first practiced as a separate branch of medicine ..... 750-800
- Medical reform inaugurated by the Empress Kōken ..... 758
- The Capital removed from Yamato to Heian jō (now Kiyōto) ... .. 784
- Active and personal reign of the Mikados (Grills)..... ..
- ..... B.C. 660 to 8th c. A.D.
- Duration of simple monarchy .. .. 8th-12th c.
- The *Dai-dō-rui-shū-hō*, a compendium of medical knowledge down to the end of the 8th century A.D., compiled by Abe no Masanao and Idzumo no Hirosada ..... 809
- First charity hospital established ..... 824-834
- Inoculation practised in China (Wylie) before the..... 9th c.
- Chin Jitsu-kuwa* (*Chin Jih-kuwa*) a famous Chinese botanist flourished (*Sung dy.*) ..... 960-1127
- I-shin-hō*, an encyclopedia of Chinese medical works of the *Sui* and *T'ang* dynasties (589-907), compiled by Tamba Yasuyori, a noted (Japanese) professor of acupuncture ..... 809
- Monobe no Asson Kōsen, "Father of Hygiene," flourished..... 9th c.
- Hon-sō-wa-miyō*, Botany written in Japanese ..... 900-20
- Period of decay of Chinese medicine in Japan ..... 1156-1600
- Military classes dominate.. 1167-1868
- Foundation in China of the schools of *Ri Tō-yen* and *Shiu Tan-kei*, which, according to Japanese writers, held internal diseases to
- Hæmorrhage arrested by applying a ligature around a limb, about. 250
- Instrument for breaking stones in the bladder, invented by Ammonius, about ..... 250
- Practice of medicine and surgery first introduced at Rome by Archagathus, who was afterward banished on account of his use of the knife and cautery; about ..... 219-200
- School of the Therapeutes found, the chief object of which was the study of the virtues of natural substances as curative or poisonous agents, about ..... 150
- Alexandrian Library first destroyed ..... middle 1st c.
- Decay of medicine began ... ..
- Greece subdued by Rome ..... 146
- Asclepiades, the first who recommended paracentesis of the abdominal parietes by acupuncture in ascites, and attempted the operation of laryngotomy, the inventor of the shower-bath, who held that the human body is permeated with pores through which atoms are continually passing, the symmetry between the pores, and the atoms which pass through them is the condition of health, while any obstruction of the pores of irregularity of distribution of the atoms constitutes disease. He professed that it is the physician's duty to "heal safely, speedily and pleasantly;" consulting the patient's inclinations and flattering their prejudices (see Nagata Tokuhon ... .. 1st. c.
- Establishment of school of Methodists, which took a middle ground in practice between the Dogmatists and Empiries, and which held that the solids of the body are first affected, and that the derangement of humors is but secondary ..... 1st c.
- Celsus, author of the celebrated work, "De Medicina," who first

- be caused by the penetration from the outside of pestilential vapor, and diseases of the alimentary canal to be due to improper food and over exertion, and also, that the body is composed of five elements corresponding with the five elements of the universe of Chinese philosophy..... 1280-1368
- Medical library of Wake Tsunenari destroyed by fire..... 1370
- Tashiro Dōdō, the first to teach the theories of *Ri Tō-yen* and *Shin Tan-kei*, born..... 1465
- Manase Shōkei, reviver of medical learning, born..... 1507
- First appearance of Europeans in Japan ..... 1543
- Introduction of Christianity, from..... 1558
- First hospital under European surgeons..... 1559
- School of medical philosophers. — Dutch physicians first appear in Japan ..... 1580-1600
- Rise of the schools of Western surgery of *Nam-ban*, Nishi, Kurizaki, Kasper and others from.. 1580
- Nagata Tokuhon, reviver of ancient Japanese medicine. 1512-1630
- Rise of the school of Gotō Tatsu, which held that any impediment to the flow or circulation of the *Spirit* causes disease ..... 1663-1687
- Syphilis first appeared at Nagasaki, said to have been imported from the south (China)..... 1623-1644
- Dr. Kaempfer arrived in China (Cleyer)..... 1668
- The "tube acupuncture needle" invented..... 1688
- The *Yamato Hon-zō*, or Botany of Japan published..... 1709
- First dissection of the human body made in Japan . . middle of the..... 18th c.
- Epidemic of cholera(?) ..... 1718
- Rise of the school of Yoseimasu Tamenori, which held all dis-
- employed ligatures for the arrest of arterial Hæmorrhage; was the first to describe the operation of depression for treatment of cataract; flourished .. B.C. 1st c.
- Christ born .....
- Aretæus was the first to make use of blisters employing cantharides .. A.D. 1st. c.
- Dioscorides, the greatest ancient authority on botany and materia medica, author of "De Materia Medica," flourished ..... 1st. c.
- Galen, the first great physician of the Christian era, and the greatest ancient authority on the pulse in the diagnosis and prognosis of diseases, and a voluminous writer, who adopted the Hippocratic theory of the 4 elements, humors and qualities, also holding that besides the solids and fluids there is a third principle, the spirits, of which there are three kinds, the natural, the vital and animal, born ... 136
- Second decline in medicine ..... 393
- Under the Christian Emperors, *archiaters* (chief physicians), established in every large town and examination of those desiring to practise medicine, made compulsory ..... 4th c.
- The first establishment of hospitals, said to have been by St. Paula, at Jerusalem ..... 4th c.
- And at Rome by Fabiola ... 5th c.
- School of medicine established at Edessa ... 6th c.
- Alexander of Tralles, the first to mention the therapeutic use of rhubarb and to propose colchicum as a remedy for gout, flourished..... 6th c.
- Paulus Aegineta the last Greek medical author of note, and the first great obstetrician, flourished middle ... 7th c.
- Aaron Ahran, the oldest medical author among the Arabs, said to have been the first to describe small-pox ..... 7th c.

- eases to be due to one specific poison, and that treatment should consist in neutralizing this poison by another poison, equally powerful, a kind of homeopathy..... 1751-1763
- The *San-ron*, an original system of midwifery, and the standard Japanese authority upon the subject, written by Kagawa Ge-yetsu ..... 1760
- Establishment of a Medical College (Chinese system) by Taki Genko ..... 1765
- Rise of the school of Yoshimasu Nagai, which held that the continual circulation of the vital spirit, air and water, constituted health, and its interruption disease ..... 1772-1780
- Sugita and Mayeno published translation of a Dutch work on anatomy ..... 1773-4
- Yemi Sampaku taught that the stoppage of food in the stomach causes all diseases ... 1780
- Vaccination introduced at Canton, by Dr. Pearson (Wylie) before. 1805
- Cholera epidemic ..... 1821-2
- Vaccination introduced at Matsumai, Yezo, from Russia by a Japanese fisherman, in ..... 1824
- Dr. von Siebold gave instruction to pupils at Nagasaki, and endeavoured to introduce vaccination.. 1824
- The practice of Western medicine prohibited by the Shogun ... 1848
- Vaccine virus introduced at Nagasaki by Dr. Mohnike, a Dutch physician ..... 1848
- Treaty with the United States established at Nagasaki under Dr. Pompe van Meerdervoort. 1857
- First hospital under foreign surgeons at Nagasaki ..... 1858
- Institution of vaccination, the foundation of the Medical Department of the University of Tokyo, established ..... 1858
- 394 Dr. Hepburn, the first Protestant medical missionary arrived at Kanagawa (Yokohama) ..... 1859
- The monks of the West practised medicine as part of their calling ..... 7th c.
- Title of physicians first applied to those who practised physic.. 8th c.
- Invasions of Spain and France by the Saracens ..... 710?
- Schools in which medicine was taught established in England ..
- Medicine ordered to be taught in the schools of Lyons, Metz and other towns in France ..... 805
- School of medicine founded at Bagdad, about ..... 763
- School of medicine founded at Cordova, about ..... 780
- University of Oxford founded .. 872
- Rhazes, a celebrated Arabian physician described small-pox and measles..... 9th and 10th c.
- Avicenna, a remarkable Arabian, author of the "Canon," and inventor of the flexible catheter and other instruments, flourished between ..... 978-1036
- Hildegard, abbess of Rupertsberg, first female physician of note, ..
- ..... 1098-1180
- Decline of the Saracenic Universities of Spain, from about... 1200
- Mondini de Luzzi, the first to conduct systematic dissections of the human body in ..... 1315
- School of chemical physicians flourished ..... 16th c.
- Foundation of the school of Vitalists and mathematical physicians ..... 1450
- The art of printing discovered.. 1450
- Syphilis said to have been first described ..... 1495
- Sydenham, the English Hippocrates, born ..... 1624
- William Harvey published his doctrine of the circulation of the blood in ..... 1628
- Powerful microscopes first used in scientific investigation..... 17th c.
- Berhaave the most eminent teacher of medicine in the early part of the ..... 18th c.



First Japanese medical students sent to Europe.....	1859	Haller, the father of modern physiology .....	1708-1777
Russians established a hospital at Hakodate .....	1858-9	The practice of inoculation from Adrianople by Mary Wortley Montagu, in .....	1717
First embassy to the United States.....	1860	Earliest example of medical teaching in America probably found in the anatomical demonstrations of Dr. Thomas Cadwalader at Philadelphia (Dunglison).....	previous to 1750
Epidemic of measles.....	1860?	Medical school, now of the University of Pennsylvania founded .....	1762
Epidemic of Cholera.....	1861-2	Medical school established at New York .....	1768
Lock-hospital established at Yokohama, and compulsory inspection of prostitutes begun ...	1867	Medical School of Harvard College, instituted .....	1782
War of the Restoration.....	1867	Discovery of vaccination by Edward Jenner .....	1797
Drs. Müller and Hoffmann, German surgeons, appointed to be professors in the Medical College, Tokiyo.....	—	Epidemic of cholera in Europe 1830-5	
Medical Bureau of the Navy organized .....	1870	Sulphuric ether first used to prevent the pain of an operation. 1846	
Embassy sent to the United States and Europe .....	1871	Chloroform as an anæsthetic discovered .....	1847-8
First Medical Journal published in Japanese .....	1872		
Sanitary Code formulated .....	1873		
Central Sanitary Bureau established .....	1873		
Vaccination made compulsory... 1874			
Medical Bureau of the Army organized .....	1874		
Compulsory examinations of candidates for license to practice medicine inaugurated .....	1875		
Japan represented in the International Sanitary Conference at Washington .....	1880		
A Japanese surgeon (Mr. Takaki) became a Fellow of the Royal College of Surgeons, England, by examination .....	1880		
New Japanese pharmacopœia begun.....	1881		
Japan represented at the International Health exhibition, London .....	1874		
Address presented to the government by the British and International Anti-vivisection societies in deprecation of the introduction of vivisection ..	1884		
First Medical Journal published (partially) in English.....	1885		

*Note.*—Since the reading of this paper before the Society in May, 1884, and whilst it has been passing through the press, the writer has availed himself of several later publications upon the subject, and has made considerable additions to his original article.

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1. The following references have been obtained chiefly from the Index Medicus, Neale's Digest, the authority already quoted, and from the writer's own notes. No attempt has been made to make the list complete as to foreign writers on Chinese medicine, mention being made only of the authors referred to in authorities quoted in these notes. The Chinese and Japanese Bibliography of the subject will be found in another place.

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400 LIST OF MEDICINES MENTIONED IN THE  
FOREGOING "NOTES."ENGLISH OR LATIN NAMES.<sup>1</sup>

Achyranthes aspera, 360	Cinnamon, 286, 287, 319, 359
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1. The figures denote the page on which the medicine is mentioned and where the Japanese or Chinese Equivalent of each name will be found.



- Ginseng, 288, 319, 363  
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Arino hifuki (桔梗), 250, 256	Hakushi 白芷, 313
Banjaku 礬石, 257	Hakutōkuwa 白桃花, 257
402 Biyakubukon 百部根, 251	Hakutsūtō 白通湯, 300
Biyakujutsu 白朮, 285	Hange 半夏, 250, 256
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2. The figures denote the page on which mention of the medicine is made and where the Latin or English equivalent will be found. When the Chinese characters opposite the Japanese names are enclosed in parentheses they represent only the Chinese name of the remedy; but when unenclosed they are also the phonetic equivalents.

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CHINESE AND JAPANESE MEDICAL WORKS. 405

The following list of the principal works upon Chinese and Japan medicine and allied subjects,<sup>1</sup> has been compiled from the several sources mentioned in the foregoing notes, and from the catalogues of the principal libraries of Japan and the Imperial Library at Pekin, and also from the lists of medical works mentioned in Wylie's "Notes on Chinese Literature," and by Paou Tso-Hwang (Ho Sa-Kuwan) in his article on Chinese Medicine (p. 293), recently published in the *Hau pao*, Shanghai.

Whilst it has been the intention of the writer to place in this list only such works as relate to Chinese and Japanese medicine as distinguished from Western medicine, nevertheless it has been found necessary to admit certain works in Japanese and Chinese on Western medicine for the reason that mention has been made of them in other portions of this paper.

The title of each work is given in Chinese characters, followed by a Roman transliteration of the same.

In order to distinguish the works of Chinese authors from those of Japanese, the transliterated titles of the Chinese works as well as the names of their authors appear in italics; the phonetic equivalent in either case being given in Sinico-Japanese, according to the pronunciation most common among the physicians of Tōkiyō.

An asterisk (\*) following the transliterated title of a work denotes that the same is included in the list furnished by the Department of Education (p. 383) of the more important medical works published in Japan; a dagger (†) denotes that the work is mentioned in Wylie's list

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1. For the western bibliography of the subject see page 395.

of the principal Chinese medical works; and a double dagger (§) denotes that the work is included in the list of books mentioned by Paou Tso-Hwang.

The figures following the title refer to the page of these notes on which mention of the work is made; and the letters a, b, c, d, f, i, and l denote the Libraries in which the works are to be found.

- 406 a, Library of Dr. Asada Sōhaku, Tōkiyō.<sup>2</sup>  
 b, Tōkiyō Library, Kanda.<sup>3</sup>  
 c, Library of the Medical Department, University of Tōkiyō.<sup>4</sup>  
 d, Library of the Uyeno Museum, Tōkiyō.<sup>5</sup>  
 f, Von Siebold's Collection of Japanese books and MS., Royal Museum, the Hague.<sup>6</sup>  
 i, Imperial Library, Pekin.<sup>7</sup>  
 l, Tōkiyō Medical Library.

The subject of each work, when known, is denoted by one or more italic letters preceding the name of the author, according to the following table:—*ac.*, Acupuncture; *ae.*, Aetiology; *an.*, Anatomy; *bi.*, Biography; *bib.*, Bibliography; *bo.*, Botany; *cat.*, Catalogue; *cf.*, Colds and Fevers (see *skr*); *cd.*, Children's Diseases; *ch i.*, Cholera Infantum; *clm.*, Clinical Medicine; *cm.*, Moxa-cauterization; *com.*, Commentary; *cr.*, Collection of Reprints; *cy.*, Cyclopædia; *do.*, Diseases of Cattle; *den.*, Dentistry; *di.*, Diarrhœa; *dg.*, Diagnosis; *dict.*, Dictionary; (*ed.*,

2. MS. Catalogue furnished by Dr. Asada.

3. Printed Catalogue.

4. MS. Catalogue furnished by Dr. Miyake Principal of the Medical Faculty.

5. From MS. Catalogue.

6. Descriptive Catalogue by J. Hoffmann 1845.

7. Printed Catalogue 欽定四庫全書總目.

Edited); *el.*, Elementary; *ep*, Epidemics; *ex.*, Explanations; *f.*, Fevers; *fd.*, Fractures and Dislocations; *gm.*, General Medicine; *gs.*, General Surgery; *hist.*, History; *if.*, Intermittent Fever; *k.*, *Kak-ke*, or Beriberi; *l.*, Leprosy; *m.*, Medicine; *mc.*, Medical Commentary; *md.*, Malarial Diseases; *me.*, Measles; *mh.*, Medical History; *mm.*, Materia Medica; *mr.*, Medical Rules; *mw.*, Medical Weights and Measures; *n*, or *nos.*, Nosology; *nd.*, Nervous Diseases; *ob.*, Obstetrics; *oph.*, Ophthalmology; *pa.*, Pathology; *ph.*, Physiology; *pm.*, Popular Medicine; *pr.*, Prescriptions; (*pt*, Part; *pub.*, Publisher); *p.*, Pulse; *s.*, Surgery; *sh.*, Shampooing; *skr.*, *Sho-kan-ron* or Discussion on the Theory of Colds and Fevers; *sp*, Small-pox; *sy.*, Syphilis; *sym.*, Symptomatology; *th.*, Therapeutics; (*v.*, Volumes, see note 55, p. 28;) *vet.*, Veterinary Medicine; *wc.*, Water Cure; *wd.*, Women's Diseases; *ws.*, Wounds, sores, etc.

It has not been possible, owing to the ambiguity of some of the titles, and to lack of reference, to give in every instance the subject of the work, and therefore when unknown or very doubtful it is omitted.

1. 按摩手引 Am ma te biki, **e**, *sh.* 藤林良伯 Fujibayashi Riyōhaku, 1 407 v, 1700
2. 按腹傳 Am puku den, **e**, *sh.* 廣川鐵齋 Hirokawa Tessai, 1 v, 1799
3. 按腹圖解 Am puku dzu kai, **a**, *sh.* 太田晋齋 Ōta Shinsai, 1827
4. 安騷活奪集 An ki kuwatsu datsu shiū, **b**, *vet.*, 20 v
5. 阿是要訣 A ze yō ketsu, 317 *cm.* 岡本一抱 Okamoto Ippō, 17th c
6. 徽毒徴恙篇 Bai doku chō hitsu hen, **a**, *sy.* 淺田宗伯 Asada Sōhaku, 1 v, 19th c
7. 梅花無盡藏 Bai kuwa mu jin zō, **ed**, *sy.* 長田德本 Nagata Tokuhon, 3 v, 1767
8. 梅花無盡藏纂紛 Bai kuwa mu jin zō san fun (MS.) **e**, *sy.* 邑壤中薪理 Yū-kuwai Chū Shin-ri, 1 v
9. 模癘新書 Bai rai shin sho, **a**, **e**, *sy.* 片倉元周 Katakura Genshiū, 2 v, 2786

10. 微療約言 *Bai riyo yaku gen*, **c**, *sy.* 村上蜀基 *Murakami Toki*, 1 v, 1802
11. 微瘡茶談 *Bai sō cha dan*, **c**, *sy.* 船越敬祐 *Funakoshi Keiyū*, 1 v, 1843
12. 微瘡秘法 *Bai sō hi hō*, **a**, *sy.* 加藤流 *Katō Riū*, 1 v
13. 微瘡秘錄 *Bai sō hi roku*, *sy.* **c**, 村上 *Murakami*, 2 v, 1774
14. 微瘡秘錄別記 *Bai sō hi roku bek ki*, **c**, *sy.* 村上 *Murakami*, 1 v, 1808
15. 微瘡秘錄標記 *Bai sō hi roku hiyo ki* **c**, *sy.* 村上 *Murakami*, 2 v, 1808
16. 微瘡口訣 *Bai sō kō ketsu*, **a**, *sy.* 獨嘯菴 *Dokushō an*, 1 v, 1782-9
17. 瘰癧私考 *Bai sō shi kō*, **a**, *sy.* 佐藤有信 *Satō Yūshin*, 1 v
18. 微瘡新書 *Bai sō shin sho*, **c**, *sy.* 青地盈林 *Awoji Yeirin*, 5 v, 1821
19. 微瘡証治秘鑑 *Bai sō shō chi hi kan*, **a**, *sy.* 橘尚賢 *Tachibana Shōken*, 2 v
20. 馬脾慾恣篇 *Ba hi chō hitsu hen*, **a**, 淺田宗伯 *Asada Sōhaku*, 1 v, 19th c
21. 馬經大全 *Ba kiyō dai zen*, **c**, *vet.* (國師) 馬師門 (*Kokushi Ba shimon*), 4 v
22. 萬安方 *Ban an hō*, 282, **ad.** 梶原性全 *Kajiwara Shōzen*, 50 v, 14th c
23. 婆心錄 *Ba shin roku*, **a**, *ob.* 1 v
24. 辨醫斷 *Ben i dan*, see 1 dan, **a**, *dy.* 鶴汀屈 *Kuwaku Teikutsu*, 2 v, 1766
25. 辨斥醫斷 *Ben seki i dan*, *dy.* **a**, 田中榮信 *Tanaka Yeishin*, 1 v, 1788
26. 辨溫熱, *Ben un netsu*, *f.* 297 吳菊通 *Go Kiku-tsū*
27. 辨溫疫論 *Ben un yeki ron*, **a**, *f.* 源惟和 *Gen Iwa*, 1 v
28. 別傳三貫方 *Betsu den san kuwan hō*, 355, *ac.* 三島安一 *Mishima Anichi*
29. 備急八藥新論 *Bi kiu hachi yaku shin ron*, **c**, *th.* 佐藤神符滿 *Satō Shinfuman*, 8 v, 1831
30. 病源候論 *Biyō gen kō ron*, 287, **ac**, *symp.* *ac.* 巢元方 *Sō Gen-hō*, 10 v, 1407
31. 病源候論割記 *Biyō gen kō ron tō ki*, *sym.* *ac.* 丹波元簡 *Tamba Genkan*, 2 v
32. 病因考 *Biyō in kō*, 320, **a**, *ae.* 後藤長山 *Gotō Konzan*, 1 v, 17th c
33. 病因考 *Biyō in kō*, **c**, *ae.* 微洵美 *Ki Jun-bi*, 1815
34. 病因精義 *Biyō in sei gi*, **a**, *ae.* 小森講茂 *Lectures by Komori*, 1813
35. 病因指南 *Biyō in shi nan*, 317, *ae.* 岡本一抱 *Okamoto Ippō*, 17th c
36. 病家須知 *Biyō ka su chi*, **c**, **d**, *mt.* 革鷄道人 *Kakkei Dōjin*, 8 v, 1833
37. 病機彙論 *Biyō ki i ron*, **a**, *pa.* 沈郡中 *Chin Kō-chiū*, 10 v
38. 病名彙解 *Biyō mei i kai*, **c**, *nos.* 桂洲甫 *Katsura Shiūho*, 7 v, 1686



39. 病名解 *Biyō mei kai*, *nos.* 中島豊足 Nakajima Hōsoku
40. 病名俗解 *Biyō mei zok kai*, *d.*, *nos.* 宜春菴 Gi Shun An, 1 v 408
41. 暴病管見 *Bō Biyō kuwan ken*, *a.*, *pa.* 田宮尙施 Tamiya Shōshi, 1 v. 1858
42. 暴瀉須知 *Bō sha su chi*, *a.*, *chi.* 淺田宗伯 Asada Sōhaku
43. 聞人氏痘疹論 *Bun jin shi tō shin ron* *e.*, *sp.* *m.* 聞人規 *Bun-jin Kī*, 1323
44. 物品識名 *Bup pin shiki mei*, *f.*, *mm.* 水谷豊文 Midzutami Hōbun, 4 v, 1800
45. 物類品隲 *Butsu rui hin hitsu*, *e.*, *mm.* 平賀 Hiraga, 6 v. 1763
46. 物產目錄 *Bus san moku roku*, 362, *mm.* 稻生宜義 Inao Nobuyoshi, 18th c
47. 治驗 *Chi ken*, *a.*, *clm.* 1 v
48. 治驗錄 *Chi ken roku*, *clm.* 18 v
49. 知機藥言 *Chi ki yaku gen*, *a.*, *th.* 田宮尙施 Tamiya Shōshi, 1844
50. 沈痾奇編 *Chin a ki hen*, *a.*, *pa.*
51. 陳荏醫話 *Chin an i wa*, *a.*, *m.* 1 v
52. 治病軌範 *Chi ri ki han*, *e.*, *m.* *di.* 大鶴東海 Ōtsuru Tōkai, 1 v, 1817
53. 治病功微篇 *Chi ri kō cho hen*, *a.*, *m.* *di.* 伊藤維恭 Itō Ikkyō, 1 v,
54. 治世與漢術 *Chi sei kō kan jutsu*,
55. 治痧要畧 *Chi sha yō riyaku*, *e.*, *m.* 東伯甫 Tō Hoku-ho, 1 v
56. 知足齋遺方 *Chi soku sai i hō*, *a.*, *pr.* 永田德本 Nagata Tokuhon
57. 知足齋藥方 *Chi soku sai kin hō*, *a.*, *th.* 永田德本 Nagata Tokuhon, 1 v
58. 知足真人本經 *Chi soku shin jin hon kiyō*, *MS.* *e.*, *an.* 峯宗伯 Mine Sōkaku, 4 v
59. 知足真經別錄茅子總理 *Chi soku shin kiyō betsu roku bō shi sō ri*, *MS.* *e.*, *an.* 峰宗伯 Mine Sōhaku, 2 v
60. 治水家言 *Chi sui ka gen*, *a.*, *tc.* 加古次主水 Kakoji Mondo 2 v
61. 治痘論 *Chi tō ron*, *e.* 池田晋柔 Ikeda Shinjiū, 1 v, 1843
62. 治痘要方 *Chi tō yō hō*, *e.*, *sp.* 池田陽溪 Ikeda Mukei, 1 v, 1835
63. 中條流產書 *Chiū jō riyū san sho*, *a.*, *ob.* 2 v, 1722
64. 仲景傷寒補亡論 *Chiū kei shō kan hō bō ron*, *a.*, *f.* (河南) 郭雍 (Kanan) Kōwaku Yō
65. 仲景傷寒論 *Chiū kei shō kan ron*, *a.*, *f.* 成無已 Sei Bu-ki, 6 v
66. 仲景傷寒論淺注 *Chiū kei shō kan ron sen chiū*, *a.*, *f.* 陳念祖 Chin Nen-so, 4 v
67. 肘後備急方 *Chiū go bi kiu hō*, *pr.* 葛洪 Kōtsu Kō, 8 v
68. 肘后方 *Chiū kō hō*, *pr.*
69. 肘后百一方 *Chiū kō hiyaku ichi hō*, *a.*, *pr.* 葛仙翁 Kōtsu sen ō, 1757

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70. 肘后百一方 *Chiū kō hyaku ichi hō*, **e**, *fr.* 劉自化, *Riū Ji-kuwa*, 1700
71. 注能毒 *Chiū nō doku*, **e**, 壺靜老 *Kō Sei-rō*, 3 v
72. 注石山醫按 *Chiū seki san i an*, **e**, *m.* 注機省之 *Chiū Kō Sei-shi*, 8 v, 1696
73. 知要一言 *Chi yō ichi gen*, **e**, *m.* 石坂宗哲 *Ishizaka Sōtetsu*, 1 v
74. 重刊本草 *Chō kan hon zō*, **a**, *mm.* 曹孝忠 *Sō Kō-chiū*, 24 v
75. 重刊神應經 *Chō kan shin ō kiyō*, **e**, *mm.* 和氣, 丹波 *Wake and Tamba*
76. 重計古今方集彙 *Chō kei kō kon hō shiū i*, **d**, *fr.* 甲賀, *Kōga*, 1 v, 1745
77. 直指方 *Choku shi hō*, **a**, *m.*
78. 長沙方歌括 *Chō sha hō ha kuwatsu*, *fr. in verse*, 陳念祖 *Chin Nen-so*, 3 v, 1780-1801
- 409 79. 長沙証彙 *Chō sha shō i*, **a**, 1 v
80. 長沙正經証彙 *Chō sha sei kiyō shō i*, **e**, 田中榮信 *Tanaka Yei-shin*, 1 v, 1791
81. 長沙痘書新編 *Chō sha tō shō shim pen*, *fr. a*, 岸田米山 *Kishida Beisan*, 1 v, 1837
82. 褚氏醫言(新刻) *Cho shi i gen*, **e**, *m.* (new edition), 胡文煥 *Ko Bun-kuwan*, 1 v, 1683
83. 張氏醫通纂要 *Chō shi i tsū san yō*, *m.* 張島巢 *Tō Chō-sō*, 4 v, 1776
84. 褚氏遺書 *Cho shi i sho*, **a**, 褚澄 *Cho Chō*, 1 v, 1823
85. 張氏醫通 *Chō shi i tsū*, **a**, *m.* 張路玉 *Chō Ro-giyoku*, 16 v
86. 朝野群載 *Chō ya gun sai*.
87. 大同醫式 *Dai dō i shiki*, *fr.* 阿部眞貞 *Abe no Masada*
88. 大同類聚方 *Dai dō rui shiū hō*, 252, 275, 276 **ad**, *fr.* 安部眞貞 *Abe no Masada*, 100 v, 808
89. 大同類聚方異本 *Dai dō rui shiū hō i hon*, *fr.* 松岡經平 *Matsuoka Keihei*
90. 大觀證類本草 *Dai kuwan shō rui hon zō*, *mm.* 唐愼微 *Tō Shin-bi*, 31 v, 1769
91. 大日本醫道沿革考 *Dai ni hon i dō yen kaku kō*, 245 *mh.* 河內全節 *Kōchi Zensetsu*, 1, 1 v, 1878
92. 大日本醫道沿革小史 *Dai ni hon i dō yen kaku sho shi*, *mh.* 郭嘉四良 *Kaku Kashirō*, 1. 2. v, 1884.
93. 大生要旨 *Dai sei yō shi*, *ob.* 唐千頃 *Tō Sen-kei*
94. 斷毒論 *Dan doku ron*, **d**, 橋本伯壽 *Hashimoto Hakujiu*, 3 v, 1809
95. 田子產則全書 *Den shi san soku zen sho*, 358 *ob.* 沼野材章 *Numano Saishō*
96. 導引秘傳南抄 *Dō in hi den nan sho*, **e**, *sh.* 後學—愚子 *Kōgaku Ichigushi* 1 v

97. 童蒙先習 Dō mō sen shiū, **a**, 2 v
98. 度量衡解 Do riyō kō kai, **a mem.** 1 v
99. 道三養生書 Dō san yō jō sho, **d**, *hy.* 曲直瀬道三 Manase Dōsan, 1 v, 1586
100. 瑞竹堂經驗方 *Dzui chiku dō kei ken riyō hō*, † *clm.* (元)沙圖穆蘇 *Sha-to-boku-sho*, (*Gen dy.*)
101. 豆州諸島物産圖說 Dzu shiū sho tō bus san dzu setsu, 364 *bo.* 田村善之 Tamura Zenshi
102. 拊脾一笑 Fu hi is shō, **a**, 1 v
103. 婦人病論 Fu jin biyō ron, **e**, *wd.* 船幾卓棠 Senki Takuto, 7 v, 1850
104. 婦人大全良方 *Fu jin daizen riyō hō* † *wd.* 陳自明 *Chin Ji-mei*, 24 v, 1237
105. 婦人方彙 Fu jin hō i, **e**, *pr. wd.* 下津春抱 Shimotsu Shunhō, 1 v
106. 婦人壽草 Fu jin jiu sō **d**, *hy.* 香月牛山 Kadzuki Gnzan 1 v, 1693
107. 婦人患病書 Fu jin kuwan biyō sho, **f**, *wd.* 1 v
108. 風寒熱病方緯編 Fū kan netsu biyō hō i hen, **a**, *f.* 宇津木昆臺 Utsuki Kontai, 7 v, 1883
109. 風寒熱病方經編 Fū kan netsu biyō hō kei hen, **a**, *f.* 宇津木昆臺 Utsuki Kontai, 7 v, 1883
110. 普救類方 Fu kiū rui hō, 362 **e**, **d**, *gm.* 林良適 Hayashi Riyōteki 12 v, 1729
111. 福田方 Fuku den hō, **b**, *pr.* 釋有隣 Shakuno Yūrin
112. 服家意教 Fuku ka i kiyō, **a**, 乘山翁 Jō San ō, 1 v
113. 復古明試錄 Fuk ko mei shi roku, **d**, 1 v
114. 腹診秘傳 Fuku shin hi den, 325 *dg.* 高村夏務 Takamura Riyōmu
115. 腹診口訣 Fuku shin kō ketsu **a**, *dg.* 萩野臺州 Ogino Taishiū, 2 v
116. 腹診秘訣 Fuku shin hi ketsu, 325 *dg.* 多賀安貞 Taga Antei
117. 腹診書 Fuku shin sho **a**, *dg.* 堀井元仙 Horii Gensen, 1750
118. 腹証奇覽 Fuku shō ki ran. 325 **a**, *dg.* 稻葉仲克 Inaba Chiūkoku 12 v
119. 腹証奇覽異 Fuku shō ki ran yoku, 325 *dg.* 和久田寅 Wakuta Tora
120. 楓亭証治辨註 Fū tei shō chi ben gi, **a**, *dg.* 福井楓亭 Fukui Fūtei 1 v
121. 楓亭方讀辨 Fū tei hō doku ben, **a**, *pr.* 福井楓亭 Fukui Fūtei 2 v
122. 腹川藥帖 Fuku yō yaku chō, *mm.* 赤城愚直翁 Akagi Guchoku ō 1 v
123. 福幼編 Fuku yō hen, *dc.* 莊一夔 Sō Ik-ki, 1777
124. 普濟方 *Fu sai hō* **e**, *m.* 朱橚 Shu Shuku, 168 v
125. 傳名醫女科 *Fu mei i jo kuwa*, **a**, *wd.* 陽曲傳山膏 *Fu San-sei* 1863
126. 接埶論疏 *Gai giyaku ron sho*, **a**, *md.* 嗣齋 Kō Sai.
127. 接埶論疏 *Gai giyaku ron sho*, **e**, *md.* 盧之頤 *Ro Shi-i*, 1 v, 1764.  
*see No. 394*
128. 接埶疏方 *Gai giyaku sho hō*, **e**, *md. pr.* 盧之頤 *Ro Shi-i*

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129. 學古診則 *Gak kō shin soku*, a, dg. 盧之頤 *Ro Shi-i*, 1700, see No. 394
130. 學晦堂醫話 *Gak kuwai dō i wa*, a, m. 淺田宗伯 *Asada Sōhaku*, 19th c
131. 眼科錦囊 *Gan kuwa kin nō*, e, oph. 本庄普一 *Honjō Fuichi*, 1831
132. 眼科錦囊續 *Gan kuwa kin nō zoku*, e, oph. 本庄普一 *Honjō Fuichi*, 1831
133. 眼科龍木論 *Gan kuwa riyō boku ron*, MS. e, oph. 10 v
134. 眼科審視瑤函拔萃 *Gan kuwa shin shi yō-kan batsu-sui*,
135. 眼科新書 *Gan kuwa shin sho*, d, oph. 5 v
136. 眼科全書 *Gan kuwa zen sho*. d, oph. 袁學淵 *Δi Gaku-yen*, 1791
137. 含章齋丸散方 *Gan shō sai guan san hō*, a, pr. 1 v
138. 外科發揮 *Ge kuwa hak ki*, e, s. 吳郡諦己 *Go-gun Shi-ki*, 8 v
139. 外科百功全書 *Ge kuwa hiyak kō zen sho*, e, s. 龔居中 *Kōyō Kōjo-chiū*, 6 v
140. 外科百功全書 *Ge kuwa hiyak kō zen sho*, a, s. (明) 龔應園 *Kōyō Ō-yen* 6 v
141. 外科方彙 *Ge kuwa hō i*, e, s. sp. 桃井碩水 *Momonoi Sekisui*, 1 v
142. 外科上池秘錄 *Ge kuwa jō chi hi roku*, e, s. 西川湖千連 *Nishikawa Koshiren*, 4 v
143. 外科十法 *Ge kuwa jū pō*, 陳括 *Chin Kuwatsu*, 1733
- 411 144. 外科細壘 *Ge kuwa sai zen*, 313, s. 鷹取秀次 *Takatori Hidetsugu*, 1596
145. 外科精義 *Ge kuwa sei gi*, f. s. 齊德之 *Sei Toku-shi*, 4 v
146. 外科正宗 *Ge kuwa sei shiū*, s. 陳實功 *Chin Jitsu-kō*, 12
147. 外科正宗 *Ge kuwa sei sō*, f. s. 陳若虛 *Chin Jaku-kiyo*, 4 v, 1663
148. 外科精要 *Ge kuwa sei yō*, s. 陳自明 *Chin Ji-mei*
149. 外科新明 *Ge kuwa shim mei*, e, s. 板坂 *Itazaka*
150. 外科新明集 *Ge kuwa shim mei shiū*, a, s. 藤原秀次 *Fujiwara Hide-tsugu*, 2 v
151. 外科證治 *Ge kuwa shō chi*, s. 許克昌, 畢法 *Kiyo Koku-shō and Hitsu Hō*, 1831.
152. 原病式 *Gen byō shiki*, e, pa. 劉完素 *Riū Kuwan-so* 2 v, 1690
153. 元亨療馬集附牛經大全 *Gen kō riyō ba shiū zet*, Appendix. *Fu giu kiyo dai zen*, dc. e, 木元亨 *Boku Gen-kō*, 6 v
154. 外臺秘書 *Ge tai hi sho*, s.
155. 外臺秘要 *Ge tai hi yō*, 320 s. 王燾 *Ō Chū*, 19 v, *Sung dy.*
156. 外臺總錄 *Getai tai sō roku*, s
157. 宜禁本草 *Gi kin hon zō*, e, mm. 2 v
158. 銀海精微 *Gin kai sei bi*, e, oph. 村上寬兵衛刊行 pub. by Murakami Kuwanbi-yō-ye 5 v, 1668

159. 銀海精微 *Gin kai sei bi, oph.* 孫子邇 *Son Shi-baku*
160. 銀海誠要 *Gin kai sei yō, a, oph.* 秋山宜修 *Akiyama Gishiū, 2 v*
161. 牛經大全 *Giū kiyō dai zen, dt.* 喻仁, 喻傑 *Yu Jin and Yu Ketsu*
162. 牛乳略考 *Giū niū riyaku kō, on Cow's milk,* 西宮宜明 *Nishinomiya Senmei, 1 v, 1883*
163. 牛山活套 *Giū san kuwatsu tō, ed, m. s.* 香月牛山 *Kadzuki Giūzan, 3 v, 1833*
164. 牛山方考 *Giū san hō kō d, m, s.* 香月牛山 *Kadzuki Giūzan, 3 v*
165. 玉函經金 *Gi'yoku kan kiyō kin, m.* 297 周楊俊 *Shū Yō-shun*
166. 御纂醫宗金鑑 *Giyo san i so kin kan m.* 90 v, 1739
167. 御藥院方 *Giyo yaku in hō, e, pr.* 千賀芳久 *Chiga Yoshihisa, 5 v, 1799*
168. 吳醫藥講 *Go i i kō m.* 唐笠山 *Tō Riu-san 1796*
169. 合類醫學入門 *Gō rui i gaku niū mon m.* 八尾玄長 *Yawo Genchō, 17 v*
170. 合類聚方規矩 *Gō rui shiū hō ki ku m.* 前川六左衛門版 pub. by Mayegawa Rokuzayemon, 1 v
171. 五色診 *Go shiki shin, 315 dg.* 倉公 *Sō Kō*
172. 吳氏家傳增補脉訣大全 *Go shi ka den zō ho miyaku ketsu dai zen,* 王叙和 *O Shuku-kurwa*
173. 五藏論 *Go zō ron an. 2 v, 1820*
174. 軍陳備要急救方 *Gun jin bi yō kiū kiū teki hō, ms.* 守拙 *Shiu Setsu, 2 v. 1856*
175. 八十一難經 *Hachi jū ichi nan kiyō, 261, 274, 319 m.*
176. 八十一難經疏証 *Hachi jū ichi nan kiyō so shō, a, m.* 丹波元胤 *Tamba Genin, 2 v.*
177. 八藥新論 *Hachi yaku shin ron, a, mm.* 佐藤方定 *Satō Hōtei*
178. 敗殼錄 *Hai koku roku, a,* 山田正珍 *Yamada Seishin, 1 v*
179. 白牛酪考 *Haku giū raku kō, on cheese* 桃井寅 *Momoi Toru*
180. 八種 *Has shū, 297 ‡ mm.* 徐靈胎 *Jo Rei-tai*
181. 平易方 *Hei i hō, e, pr.* 葉氏墓樵 *Shō Bo-shō, 4 v, 1804*
182. 砭道錄 *Hen dō roku, 356 ac.* 垣本鍼源 *Kakimoto Shingen*
183. 扁鵲傳正解 *Hen jaku den sei kai, e, bi.* 中丞謙 *Chū Kēi-ken, 1 v, 1809*
184. 扁鵲會公傳 *Hen jaku sōkō den, a, bi. 1 v*
185. 扁鵲心書 *Hen jaku shin sho, e, m. 3 v, see No. 394*
186. 扁倉傳割解 *Hen sō den kak kai, b, bi.* 安藤惟寅 *Andō Iin*
187. 扁倉傳割解 *Hen sō den kak kai, e, bi.* 源龍 *Gen Ryū, 2 v, 1770*
188. 秘傳眼科龍木論 *Hi den gan kuwa riyō hoku ron, a, oph.*
189. 秘傳花鏡記聞 *Hi den kuwa kiyō ki bun, b, sy.* 寺尾顯融 *Terao Kenyū*
190. 脾胃論 *Ii i ron, 304, e, an.* 李果明之 *Ri Tō-yen, 133, 6*

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191. 秘笈考証引言 *Hi kiū kō shō in gen*, **a**, 分部春塘 Wakebe Shuntō, **1 v**
192. 品物識名 *Hin butsus shiki mei*, 255 *dict.*
193. 百一選方 *Hiyaku ichi sen hō*, *fr.*
194. 百品考 *Hiyaku hin kō*, *mm.* 小野蘭山 Ono Ranzan
195. 百味主能諺解 *Hiyaku mi shiu nō gen kai*, 317, *th.* 岡本一抱 Okamoto Ippō
196. 非藥選 *Ili yaku sen*, **c**, *mm.* 旭山 Kiyokusan, **3 v**, 1738
197. 百疾一貫 *Hiyaku shitsu ik kuwan*, *fa.* 和田東郭 Wada Tōkuwaku, **2 v**
198. 豹班錄 *Hiyō han roku*, **a**, *m.* 奈須恒德 Nasu Kōtoku, **1 v**, 1801
199. 方義解 *Hō gi kai*, *pr.* 武藤直記 Mutō Chokuki
200. 方伎雜誌 *Hō gi zas shi*, **ed**, *med. jour.* 尾臺裕堂 Bitai Yō dō, **2 v**, 1870
201. 庖厨正要 *Hōchiū sei yō*, 362 *on cookery*, 松岡玄達 Matsuoka Gentatsu
202. 方幹 *Hō kan*, **a**, *pr.* 柴田元泰 Shibata Gentai, **2 v**
203. 方函口訣 *Hō kan kō ketsu*, **a**, 淺田宗伯 Asada Sōhaku, **3 v**
204. 北山醫話 *Hoku san i wa MS*, **c**, *m.* **1**
205. 本朝醫談 *Hon chō i dan*, 258, **a**, *mh.* 奈須恒德 Nasu Kōtoku, **2**
206. 本朝醫考 *Hon chō i kō*, **c**, **e**, **d**, *mh.* 黒川道祐 Kurokawa Dōyū, **1**
207. 本朝食鑑 *Hon chō shoku kan*, **b**, *on foods* 野必大 Ya Hitsudai, 1697
208. 本道醫療近略 **a**, *m.* *Hon dō i riyō kinryaku*, **1**, 1801-4
209. 本事方 *Hon ji hō*, 許叔微 **a**, *m.* *Kiyo Shiku-bi*, **4**, 1185
210. 本經逢原 *Hon kiyō hō gen*, **a**, *m.* 張路玉 Chō Rō-giyoku, **4**
211. 本邦老醫經驗傳 *Hon pō rōi kei ken den*, **a**, *clm*
212. 本草 *Hon zō*, 278, 281, 293, 297, 362 *mm.*
213. 本草拔萃 *Hon zō bas sui*, **f**, *mm.* 水谷助六 Mizutani Sukeroku **5**
214. 本草拔萃 *Hon zō bas sui*, **f**, *mm.* 大窪太兵衛 Ōkubo Tahiyōye, **5**
215. 本草拔萃 *Hon zō bas sui*, **f**, *mm.* 宇田川榕菴 Udagawa Yōan, **1**
216. 本草備考 *Hon zō bi yō*, *mm.* 汪昂 W'ō K'ō, 1694
217. 本草圖譜 *Hon zō dzu fu*, **b**, *bo.* 岩崎常正 Iwasaki Tsunemasa 1830
- 413 218. 本草圖異 *Hon zō dzu yoku*, 362, *bo.* 稻生宜義 Inao Nobuyoshi
219. 本草原始 *Hon zō gen shi*, **f**, *bo.* 雷公炮 Rai Kō-hō, **5 v**, 1698
220. 本草玉石部 *Hon zō giyoku seki bu*, *minerals* 喜多村寛 Kitamura Kuwan
221. 本草彙言 *Hon zō i gen*, **f**, *bo.* 倪朱謨 Tas Shiu-bo, of the Ming, **6 v**
222. 本草彙言摘要 *Hon zō i gen teki yō*, 362, *mm.* 松岡玄達 Matsuoka Gentatsu
223. 本草—家言 *Hon zō ik ka gen*, 362. *mm.* Matsuoka Gentatsu
224. 本草乘雅半偈 *Hon zō jō ga han ketsu*, **i**, *mm.* 盧之頤 Rō Shi-i, **10 v**
225. 本草經讀 *Hon zō kei doku*, *mm.* 陳念祖 Chin Nen-so

226. 本草啓蒙 Hon zō kei mō, 255, 363, *bo.* 小野職博 Ono Motohiro
227. 本草紀聞 Hon zō ki bun, *a, bo.* 喜多村寛 Kitamura Kuwan 2 v
228. 本草經解要 Hon zō kiyō kai yō *mm.* 葉天士 Shō Ten-shi, 1724
229. 本草考彙 Hon zō kō i, *b, mm.* 葉科玄隆 Warashina Genriū, 23 v
230. 本草綱目 Hon zō kō moku, *bf, †* 273, 362 *mm.* 李時珍 Ri Ji-chin, 52 v, 1596
231. 本草綱目 Hon-zō-kō-moku, 362 *a, mm.* 36 v
232. 本草綱目啓蒙 Hon zō kō moku kei mō, *bf, mm.* 小野蘭山 Ono Ranzan, 1847
233. 本草序例註 Hon zō jo rei chiū, *d, mm.* 7 v, 1468, Jap. Ed. pub. by 西田 Nishida
234. 本草寫眞 Hon zō sha shin, *f, bo.* 水谷助六 Midzutani Sukeroku, 2 v
235. 本草寫眞 Hon zō sha shin, *f, bo.* 宇田川榕菴 Udagawa Yōan, 1 v
236. 本草寫眞 Hon zō sha shin, *f, bo.* 桂川甫賢 Katsuragawa Hoken, 1 v,
237. 本草草原 Hon zō shiū gen, *e, mm.* 張志聰 Chō Shi-sō, see No. 397
238. 本草從新 Hon zō shō shin, *a, 吳儀洛 Go Gi-raku, 1757*
239. 本草宗原 Hon zō sō gen, *ae, mm.* 高世拭 Kō Sei-shiki, 1 v
240. 本草通串 Hon zō tsū kuwan, *f, mm.* 前田利保 Mayeda Toshiyasu
241. 本草和名 Hon zō wa miyō, *a, 278, 283, 361, mm.* 深江輔仁 Fukaye Hojin, 1 v, 1798
242. 本草匯 Hon zō wai, *f, bo.* 郭佩蘭 Kuwaku Hai-ran, 18 v, 1666
243. 本草和解 Hon zō wa kai, *f, bo.* 大江頤軒 Ōye Iken, 2 v, 2712
244. 本草藥名備考和調鈔 Hon zō yaku mei bi kō wa kun shō, *b, mm.*  
丹波賴理 Tamba Yorimasa, 7 v, 1807
245. 芳翁醫談 Hō ō i dan, *a, m.* 慎獨軒老人 Shindokuken Rōjin, 2 v
246. 保產萬全書 Hō san ban zen sho, *a, ob.* 陳治道 Chin Chi-dō
247. 保產機要 Hō san ki yō, *a, ob.* 1 v, 1693
248. 補正新刻延壽類集 Hō sei shin koku yen jiu rui shiū, *d, hg.* 2 v
249. 補正輯光傷寒抄 Hō sei shiū kō shō kan shō, *f, d, 2 v*
250. 保生醉事 Hō sei sui ji, *e, hy.* 淇右子 Kī Yū-shi, 1 v
251. 保赤全書 Hō seki zen sho, *e, cd.* 吳文炳 Go Bun-hei, 2
252. 絳雪園古方選註三卷附得宜本草一卷 Hō setsu yen kō hō sen chiū, 3 v, appended Toku gi hon zō, *i, 王子接 O Shi-setsu 1 v*
253. 保壽新論 Hō shi shin ron, *e, den.* 高山紀齊 Takayama Kisai, 2 v, 1881
254. 棒心方 Hō shin hō, *d, pr.* 中川公 Nakagawa Kō, 1 v, 1451
255. 保嬰須知 Hō yei su chi, *e, cd.* 片倉鶴陵 Katakura Kuwakuriyō, 2 414 v, 1848
256. 方輿紀聞 Hō yo ki bun, *a, pr.* 和田東郭 Wada Tōkuwaku, 5 v

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257. 醫案輯語便要 *I an shiū go ben yō*, **c**, *dict.* 江馬元齡 Yema Genrei, 1 v, 1877
258. 醫辨救急十九方 *I ben kiū kiū jiū ku hō*, 永田德本 Nagata Tokuhon
259. いちしの花 *I chi shi no hana*, 三和鷄鷹 Miwa Torimaro
250. 醫斷 *I dan*, 323, **c**, *see ref.* 鶴元逸 Tsuru Genitsu, *compiler*, 1 v, 1759, Written by Yoshimasu Tamenori.
261. 醫道日用綱目 *I dō nichi yō kō moku*, **bd**, *fm.* 本郷正豊 Hongō Masatoyo, 1 v, 1873
262. 醫道二千年眼科目編 *I dō ni sen nen gan kuwa moku hen*, **c**, *oph.* 村井柅 Murai Chin, 13, 1812
263. 醫道二千年眼科目評 *I dō ni sen nen gan kuwa moku hiyō*, *oph.* 岩田廣彦 Iwata Kōgen
264. 醫學辨害 *I gaku ben gai*, **c**, *sm.* 宇治田雲菴 Ujita Unan, 12 v, 1683
265. 醫學知環 *I gaku chi kuwan*, **a**, *sm.* 淺田宗伯 Asada Sōhaku
266. 醫學知津 *I gaku chi shin*, **c**, *sm.* 宮田全澤 Miya-ta Zentaku, 1744
267. 醫學童子抄 *I gaku dō ji shō*, 古林見宜 Kobayashi Kengi
268. 醫學元戎 *I gaku gen jūn*, **c**, 王好古 *O Kō-kō*, 12 v, 1562
269. 醫學源流論 *I gaku gen riū ron*, **ci**, *sm.* 徐鍾胎 Jo Kei-tai, 1 v, 1757, 1852
270. 醫學原始 *I gaku gen shi*, **a**, *sm.* 王宏翰 *O Kō-kan*, 1 v, 1688
271. 醫學發明論 *I gaku hatsu mei ron*, **c**, *sm.* 東垣 Tō-yen, 2 v, 1734
272. 醫學彙纂指南 *I gaku i san shi nan*, **i**, 端木緒 Tan Boku-shin, 8 v
273. 醫學實在易 *I gaku jitsu zai i*, **a**, *sm.* 陳念祖 Chin Nēn-so, 4 v
274. 醫學求真錄總論 *I gaku kin shin roku sō ron*, *sm.* **i**, 黃宮繡 Kō Kū-shiū, 5 v
275. 醫學講談發端辨 *I gaku kō dan hat-tan ben*, **c**, *sm.* 岡本一抱 Okamoto Ippō, 2 v, 1700
276. 醫學綱目 *I gaku kō moku*, **c**, *sm.* 履齋曹灼 Ri Sei Sō-shaku, 40 v, 1565
277. 醫學管見 *I gaku kuwan ken*, **i**, *sm.* 何塘 Kā Tō, 1
278. 醫學蒙求 *I gaku mō giū*, **d**, *sm.* 伊東見龍 Itō Kenryō, 2 v
279. 醫學入門 *I gaku nū mon*, **c**, *sm.* 李挺 Ri Tei, 7 v, 1575
280. 醫學入門假名抄 *I gaku nū mon ka na shō*, *sm.* 古林見宜 Kobayashi Kengi
281. 醫學六要 *I gaku riku yō*, **c**, *sm.* 張三錫 Chō San-seki, 40 v
282. 醫學三字經 *I gaku san ji kiyō*, **a**, *sm.* 陳念祖 Chin Nēn-so, 2 v
283. 醫學三藏辨解 *I gaku san zō ben kai*, *sm.* 岡本一抱 Okamoto Ippō
284. 醫學正傳 *I gaku sei den*, **c**, *sm.* 虞搏 Gu Haku, 8 v, 1515, 1659
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- 芷園臆草存案 *Shi yen oku sō son an*
- 傷寒金鏡錄 *Shō kan kin kiyō roku*
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463. 假名安騏集 *Ka na an ki shiū*, **c**, *vet. in kana*, 道派史 *Dō Ha shō*, 6 v
464. 假名雲林神穀 *Ka na un rin shin koku*, 古林見宜 *Kobayashi Kengi*
465. 泉康口中秘傳 *Kane yasu kō chiū hi den*, **da**, *dm* by Kaneyasu, 2 v
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470. 韓氏醫通 *Kan shi i tsū*, **a**, *m.* 程永培 *Tei Yei-bai*, 1 v, 1736-96
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473. 歌傷寒雜病論俗解 *Ka shō kan zatsu biyō ron zoku kai*, **c**, *f.* 革齋  
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480. 景岳全書 *Kei gaku zen sho*, **bc**, *m. p. cf. wd. ed. sm fox. s. mm.* 張  
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606. 皇國醫事沿革小史 Kō koku i ji yen kaku shō shi, 282, *mh*. 郭賀四郎 Kaku Kashiro, 2 v, 1884-5
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610. 古今醫統 Kō kon i tō, **b**, *my*. 明徐東臯 Jō Tō-kō, of the Ming dy.
611. 古今名醫彙粹 Kō kon mei i i sui, **a**, 羅東美 Ra Tō-bi, 8 v, 1799
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828. 侶山堂類辨 *Riyo san dō rui ben*, **a**, 張志聰 *Chō Shi-sō*, 1 v, 1765. *See* No. 397
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830. 魯府秘方 *Ro fu hi hō*, **i**, 劉應泰 *Riū Ō-tai*, 4 v
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832. 論語 *Ron go*, 261, 269, *sayings of Confucius*
833. 論溫熱 *Ron on netsu*, 297, ‡ *f.* 薛生白 *Setsu Sei-haku*
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836. 顛癲經 *Ro ten kiyō*, **a**, *an.* 衛沈 *Yei Chin*, 1 v

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837. 類方馬經 *Rui hō ba kiyō*, 1, vet. 6 v
838. 類編南北經驗醫方大成 *Rui hen nam boku kei ken i hō tai sei*, 1, 江文孫 *Kō Bun-sō*, 10 v
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842. 類聚方集覽標註 *Rui shiū hō shiū ran hiyō chiū*, e, m. 煥子炳 *Notes by Kuwan Shi-hei*, 1831, 1 v
843. 類聚方集成標註 *Rui shiū hō shiū sei*, with Notes, e, m. 吉益東洞 *Yoshimasu Tōdō*, 1 v, 1858
844. 類証辨異全九集 *Rui shō ben i zen ku shiū*, e, 1 v, 1699 431
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846. 類症普濟本事方 *Rui shō fu sai hon ji hō*, ei, m. 許叔微 *Kiyo Shuku-bi*, 4 v
847. 類腋 *Rui yeki*, a, 姚培謙 *Yō Bai-ken*
848. 痧病玉衡書 *Sa biyō gi yoku kō sho*, \* ch. 郭志達 *Kuwaku Shi-sui*, 5 v
849. 痧病雨水毒考 *Sa biyō u sui doku kō*, a, ch. 石上淳 *Ishigami Jun*, 1 v
850. 痧脹玉衡全書 *Sa chō giyoku kō zen sho*, † ac. 郭志達 *Kuwaku Shi-sui*, 3 v, 1675, 1724
851. 濟民記 *Sai min ki*, 曲直瀨正紹 *Manase Shōshō*
852. 濟生備考 *Sai sei bi kō*, d, pr. 杉田成卿 *Sugita Seikei*, 2 v, 1850
853. 濟生方 *Sai sei hō*, d, pr. 1 v
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856. 濟生餘言 *Sai sei yo gen*, 山脇東洋 *Yamawaki Tōyō*
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858. 崔真人脈訣 *Sai shin jiu miyaku ketsu*, 1, 紫虛真人 *Shikiyo Shin-jin*, of the Sung, 1 v
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863. 撮解集 *Sai yō shiū*, 施藥院宗伯 *Seyakuin Sōhaku*
864. 作劑鑑 *Saku zai kan*, a, mm. 1 v, 1850
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866. 纂言方考 *San gen hō kō*, 名護屋玄醫 *Nagoya Geni*
867. 纂言方考評議 *San gen hō kō hiyō gi*, e, pr. 野村玄敬 *Nomura Genkei*, 1 v, 1831

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868. 纂言方考首書 San gen hō kō shiu sho, 北山友松子 Kitayama Yūshōshi
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886. 產科指南 San kuwa shi nan, **d**, *ob.* 2 v
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888. 產科新論 San kuwa shin ron, **c**, *ob.* 立野龍貞 Tatsuno Riūtei, 3 v, 1820
889. 產科新論 San kuwa shin ron, **d**, *ob.* 立野龍定 Tatsuno Riūtei, 1 v, 1819
890. 產科集成 San kuwa shiū sei, **a**, *ob.* 淺田宗伯 Asada Sōhaku, 4 v
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904. 成方切用 *Sei hō setsu yō*, *ei, th.* 吳儀洛 *Go Gi-raku*, 8 v, 1761
905. 西醫今日方 *Sei i kon nichi hō*, *d.* 藤林普山 *Fujibayashi Fuzan*, 6 v, 1848
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911. 濟壽館醫籍備考 *Sei jiu kuwan i jaku bi kō*, *d, index medicus*, 高島祐啓岡田昌春 *Takashima Yūkei and Okada Shōshnn*, 4 v, 1877
912. 靜驗堂冷驗 *Sei ken dō chi ken*, *e, clm.* 片倉元周 *Katakura Genshiū*, 3 v
913. 癩狗傷考 *Sei kō shō kō*, *ed, hydrophobia*, 原立與 *Hara Genyo*, 1 v, 1796
914. 正骨便要 *Sei kotsu ben yō*, *e, fd.* 大町丈庵 *Ōmachi Jōan*, 1 v
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918. 青囊秘錄 *Sei nō hi roku*, *a, pr.* 華岡震 *Hanaoka Shin*, 1 v
919. 青囊括餘 *Sei nō kuwatsu yo*, *e, pr.* MS. copy, 2 v
920. 青囊瓊探 *Sei nō sa tan*, 片倉元周 *Katakura Genshiū*
921. 靜養真方 *Sei nō shin hō*, 小林見宜 *Kobayashi Kengi*
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927. 生生堂稜記 *Sei sei dō shiū ki*, 中神琴溪 *Nakagami Kinkei*
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931. 製劑記 *Sei zai ki*, MS. copy, *pharm. d.* 曲直瀨正紹 *Manase Shōshō*, 1 v
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935. 石室秘錄 *Seki shitsu hi roku*, **ai**, *m.* 金孝芭 rev. by *K'in Kō-ki*, 6 v, 1689
936. 赤水玄珠 *Seki sui gen shiu*, **e**, \* *wd.* 孫一奎 *Son Ik-kei*, 51 v, 1657
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996. 神醫方傍註 Shin i hō hō chiū, *ancient med.* 關政方 Seki Masakata

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997. 神醫方註解 Shin i hō chiū kai, *ancient med.* 關政方 Seki Masakata
998. 心醫集 Shin i shiū, a, 祝登元 Shuku Tō-gen, *later ed.* 6 v, 1660, 1879
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1000. 新携註解張仲景傷寒發微論 Shin kei chiū kai chō chiū kei shō kan hatsu bi ron, e, f. 許叔微 Kiyō Shuku-bi, 1 v, 1611
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1027. 神農本草經 Shin nō hon zō kiyō, \* mm. 丹波元賢 Tamba Genken, 3v



1028. 神農經 *Shin nō kiyō*, ‡ *mm.* 神農 *Shin-nō*
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1036. 新增愚按口決集 *Shin zō gu an kō ketsu shiū*, e, 土佐道壽 *Tosa no Dōjiu* with additions by 中山三柳 *Nakayama San riū*, 3 v, 1754
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1039. 新添活纂要 *Shin ten shiū kuwatsu san yō*, e, 1 v
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1091. 傷寒方 Shō kan hō, *e, f.* 中澤養亭 Nakazawa Yōtei 1 v, 1777
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1125. 傷寒歸真 *Shō kan ki shin*, a, f.
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1143. 傷寒論辨正 *Shō kan ron ben sei*, ae, f. 中西深濟 *Nakanishi Shinsai*,  
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1158. 傷寒論記聞 *Shō kan ron ki bun*, a, f. 笠原元悅 *Kasawara Gen-*  
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1164. 傷寒論劉氏傳 *Shō kan ron riū shi den*, e, f. 棟田良民 *Mumeda*  
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1165. 傷寒論類方 *Shō kan ron rui hō*, e, f. 徐靈胎 *Jō Rei-tai*, 1759. 1790
1166. 傷寒論類証 *Shō kan ron rui shō*, b, f. 寺尾顯融 *Terao Kenyū*, I v
1167. 傷寒論六書 *Shō kan ron roku sho*, e, f. 陶華 *Tō Kuwa*, 4 v, 1445:  
contains the following six works:
1168. 傷寒瑣言 *Shō kan sa gen*
1169. 家秘的本 *Ka hi teki hon*
1170. 殺車槌法 *Sas sha tsui hō*
1171. 一提全 *It tei zen*
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1175. 傷寒論正文復正解 *Shō kan ron sei bun fuku sei kai*, d, f. 古矢知白  
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1176. 傷寒論叢 *Shō kan ron shiki*, a, f. 淺田宗伯 *Asada Sōhaku*, 6 v
1177. 傷寒論新疏 *Shō kan ron shin so*, a, f. 喜多村直寬 *Kitamura Choku-*  
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1178. 傷寒論集註 *Shō kan ron shiū chiū*, e, f. 張志聰 *Chō Shi-sō*, and 高世拭 *Kō Sei-shiki*, 6 v, 1683
1179. 傷寒論輯義 *Shō kan ron shiū gi*, ed, f. 丹波元簡 *Tamba Genkan*, 10 v, 1801, 1822
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1183. 傷寒論章句 *Shō kan ron shō ku*, e, f. 吉益南涯 *Yoshimasu Nan-gai*, 1 v, 1811
1184. 傷寒論手引草 *Shō kan ron te biki gusa*, 加藤謙齋 *Kato Kensai*
1185. 傷寒論定本 *Shō kan ron tei hon*, e, f. 1 v, 1786
1186. 傷寒論摘要 *Shō kan ron teki yō*, a, f. 1 v
1187. 傷寒論特解 *Shō kan ron toku kai*, e, f. 淺野徽補註 *Notes by Asano Ki*, 7 v, 1970
1188. 傷寒論蘊要全書 *Shō kan ron un yō zen sho*, MS. Copy e, f. 吳綬 *Go Jiu*, 4 v
1189. 傷寒論和語示蒙 *Shō kan ron wa go shi mō*, d, f. 宮崎貞順 *Miyazaki Teijun*, 2 v, 1837
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1373. 圖南先生新論 *Tō nan sen sei shin ron*, **a**, 阿部煥俊 *Abe Kuwan-shun*, 1 v
1374. 頓意鈔 *Ton i shō*, **b**, *m.* 梶原性全 *Kajiware Shōzen*, 30 v, 1303-5
1375. 吐納暇言 *To nō ka gen*, **a**, *sh.* 有木吉 *Ariki Kitsu*, 1 v, 1761
1376. 砒草 *Toride gusa*, **a**, *mil.* 原南陽 *Hara Nanyō*, 1 v, 1856
1377. 痘疹治術傳 *Tō shin chi jutsu den*, **c**, *sp. me.* 明戴曼公 *Tai Man-kō of the Ming dy* 池田瑞仙再校 *Jap. Ed. by Ikeda Zuisen*, 1 v
1378. 痘疹玉環方 *Tō shin giyoku kuwan hō*, *sp. me.* 橋春暉 *Tachibana Shunki*
1379. 痘疹戒草 *Tō shin kai sō*, *sp. me.* 池田錦橋 *Ikeda Kinkiyō*
1380. 痘疹救逆方 *Tō shin kiū giyaku hō*, **a**, *sp. me.* 三浦貞國 *Miura Sadakuni*, 1 v
1381. 痘疹活幼心法 *Tō shin kuwatsu yō shin hō*, **c**, *sp. me.* 聶尚恒 *Chō Shō-kō*, 2 v
1382. 痘疹旋 *Tō shin saku*, *sp. me.* 原南陽 *Hara Nanyō*
1383. 痘疹水鏡錄 *Tō shin sui kiyō roku*, 橋春暉 *Tachibana Shunki*
1384. 痘疹通 *Tō shin tsū*, **c**, *sp. me.* 上月尊安甫 *Kōdzuki Senanho*, 1 v
1385. 痘證理辨 *Tō shō ri ben*, **i**, *sp.* 明汪機 *Wō Kī of the Ming*, 1 v
1386. 痘瘡規 *Tō sō ki*, 片倉鶴陵 *Katakura Kuwakuriyō*
1387. 屠蘇考 *To so kō*, **c**, *mm.* 多紀元簡 *Taki Genkan*, with sup. by 片倉元周 *Katakura Genshiū*, 1 v, 1788
1388. 屠蘇考 *To so kō*, **a**, *mm.* 小川汶菴 *Ogawa Binan*, 1 v
1389. 痘瘡新論 *Tō sō shin ron* *sp.* 中島豐足 *Nakashima Hōsoku*

1390. 洞天奧旨 *Tō ten oku shi*, † s. 陳士鐸 *Chin Shi-taku*, 12 v, 1698
1391. 湯液本艸 *Tō yeki hon zo*, **cil**, *mm*. 王好古 *Ō Kō-ko*, 3 v, see No. 1392
1392. 東垣十書 *Tō yen jis sho*, **cil**, *cr. m.* (see each work also under number 447 given below), comp. by 王宇泰 *Ō U-tai*, 20 v, 1529
- 脉訣 *Miyaku ketsu*; No. 707
- 局方發揮 *Kiyoku hō hak ki*; No. 579
- 脾胃論 *Hi i ron*; No. 190
- 格致餘論 *Kaku chi yo ron*; No. 461
- 蘭室秘藏 *Ran shitsu hi zō*; No. 795
- 內外傷辨惑論 *Nai guwai shō ben waku ron*; No. 722
- 此事難知 *Shi ji nan chi*; No. 978.
- 湯液本艸 *Tō yeki hon zō*; No. 1391
- 醫經溯洄集 *I kiyō sō kurwai shiū*; No. 356
- 外科精義 *Ge kurwa sei gi*; No. 14a
1393. 通天曉 *Tsū ten giyō a*,
1394. 通俗醫海腰舟 *Tsū zoku i kai yō shiū*, 岡本啓迪院 *Okamoto Keiteikiin*
1395. 運氣易覽 *Un ki i ron*, **i**, 明汪機 *Wō Ki of the Ming*, 3 v
1396. 運氣論諺解 *Un ki ron gen kai*, 岡本一抱 *Okamoto Ippō*
1397. 運氣算法 *Un ki san hō*, 香月牛山 *Kadzuki Giūzan*
1398. 運氣定論 *Un ki tei ron*, **i**, 明董說 *Tō Setsu of the Ming*, 1 v
1399. 瘟疫論 *Un yeki ron*, 1 v, 補遺 *Ho i*, Supplement, 1 v, **i**, *ep.* 明吳又可 *Go Yū-ka of the Ming*,
1400. 和語本草綱目 *Wa go hon zō kō moku*, 317 **b**, *mm*. 岡本一抱 *Okamoto Ippō*, 1698
1401. 和語醫療指南 *Wa go i ryō shi nan*, 岡本一抱 *Okamoto Ippō*
1402. 和方一萬方 *Wa hō ichi man hō*, **d**, *pr.* 村井純 *Murai Chin*, 11 v
1403. 和方凍青堂家言 *Wa hō tō sei dō ka gen*, **e**, *pr.* 沙門慈赫 by the Priest *Jikaku*
1404. 和韓醫談 *Wa kan i dan*, **d**, *meth.* 坂上善之 *Sakanouye Zenshi*, 1 v
1405. 和韓醫話 *Wa kan i wa*, **d**, *meth.* 1 v
1406. 倭韓問答 *Wa kan mon dō*, **d**, *meth.* 1 v
1407. 和韓人參考 *Wa kan nin jin kō*, 加藤謙齋 *Katō Kensai*
1408. 和韓三才圖會 *Wa kan san sai dzu ye*, 255 *cy*, 105 v, 1714.
1409. 和韓嬰童醫按 *Wa kan yei dō i an*, **e**, *cd.* 樋口玄信 *Higuchi Genshin*, 12 v, 1696
1410. 和名本草 *Wa miyo hon zō*, 255, **d**, *bo.* 向井元升 *Mukai Genshō*
1411. 和名鈔 *Wa miyō shō*, 255
1412. 和蘭藥選 *Wa ran yaku sen*, *dict.* 桂川甫周 *Katsuragawa Hoshii*
1413. 和蘭全驅內外分圖 *Wa ran zen kunai guwai bun dzu*, 本木子意 *Motoki Shii*, 2 v, 1774

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1414. 和劑方 *Wa zai hō*, 288, *pr.* See *Wa zai kiyoku hō*  
 1415. 和劑局法 *Wa zai kiyoku hō*, 282, 288, 303, *+* *pr.*  
 1416. 和劑局法發揮 *Wa zai kiyoku hō hak ki*, 304, 朱丹溪 *Shiu Tan-kei*  
 1417. 藥醫問答 *Yaku i mon dō* 長澤道壽 *Nagasawa Dōjiu*  
 448 1418. 藥徵 *Yaku chō* **d**, 吉益爲則 *Yoshimasu Tamenori*, 3 v, 1717  
 1419. 藥雅 *Yaku ga* **a**, *mm.* 丹波元胤 *Tamba Genin*, 1 v  
 1420. 藥翹楚編 *Yaku giyō so hen* **a**, 1 v  
 1421. 藥語 *Yaku go*, *dict.* 原南陽 *Hara Nanyō*  
 1422. 藥品解 *Yaku hin kai* *mm.* 中島豐足 *Nakajima Hōsoku*  
 1423. 藥品應手錄 *Yaku hin ō shu roku* 高良齋 *Kō Riyōsai*, 1 v, 1826  
 1424. 藥品手引草 *Yaku hin te biki gusa* 加藤謙齋 *Katō Kensai*  
 1425. 藥方 *Yaku hō*, 297 *+* *pr.*  
 1426. 藥治通議 *Yaku ji tsū gi* **a**, *th* 丹波元堅 *Tamba Genken*, 5 v, 1839  
 1427. 藥方小牋 *Yaku hō shō sen* 橘春暉 *Tachibana Shunki*  
 1428. 藥經 *Yaku kiyō*, 280  
 1429. 藥鏡 *Yaku kiyō* **i**, 明蔣儀 *Shō Gi of the Ming*, 4 v  
 1430. 藥名異錄 *Yaku mei i roku* 五十川了庵 *Isogawa Riyōan*  
 1431. 藥名稱呼 *Yaku mei shō ko* *dict.* 木原宗貞 *Kiwara Sōtei*, 1 v, 1823  
 1432. 藥名類抄 *Yaku mei shō* **a**, *mm.* 喜多村寬 *Kitamura Kuwan*  
 1433. 藥能方法辨 *Yaku nō hō hō ben th.* 宇津木昆臺 *Utsuki Kontai*, 1883  
 1434. 藥能解 *Yaku nō kai* *th.* 武藤直記 *Mutō Chokuki*  
 1435. 藥量考 *Yaku riyō kō* 村井杵 *Murai Chin*  
 1436. 藥籠本草 *Yaku rō hon zō* 香月牛山 *Kadzuki Giūzan*  
 1437. 藥論 *Yaku ron*, 315, 倉公 *Sō Kō*  
 1438. 藥性 *Yaku sei*, 278  
 1439. 藥選 *Yaku sen*, 320 *pr.* 香川修德 *Kagawa Shiūtoku*  
 1440. 藥選續編 *Yaku sen zoku hen*, 230, 香川修德 *Kagawa Shiūtoku*  
 1441. 藥性記辨解 *Yaku shō ki ben kai*  
 1442. 藥書明堂圖 *Yaku sho mei dō dzu*, 362, 354, *mm. diagrams*,  
 1443. 藥性能毒 *Yaku shō nō doku*, 曲直瀬正紹 *Manase Shōshō*  
 1444. 藥性集要 *Yaku shō shiū yo*, 362, 廬草碩 *Ro Sōseki*  
 1445. 大和本草 *Yamato hon zō* \* 255, 361, 362, *bo.* 貝原篤信 *Kaibara Tokushin*, 10 v, 1708  
 1446. 大和本草一家言 *Yamato hon zō ik ka gen*, 362, *bo.*  
 1447. 山脇原二氏家藏方 *Yama waki hara ni shi ka zō hō* *pr.*, 1 v  
 1448. 山脇尚德方函 *Yama waki shō toku ho kan*, **a**, *pr.*  
 1449. 營實新効方 *Yei jitsu shin kō ho*, **c**, 宇佐美主善 *Usami Shinzen*, 1 v, 1822  
 1450. 衛濟寶書 *Yei sai hō sho*, **i**, 東軒居士 *Tō-ken Kō-ji*, 2 v  
 1451. 衛生秘要抄 *Yei sei hi yō shō*, **a**, *hy.*, 1 v

1452. 衛生十全方 *Yei sei jiu zen hō, i, hy.* 3 v, Appended 奇疾方 *Ki shitsu hō, 1 v*, 宋夏德, *Ka Toku of the Sung*
1453. 衛生家寶 *Yei sei ka nō, a, hy.* 朱公端 *Shiū Kō-tan*, 6 v
1454. 衛生鴻寶 *Yei sei kō hō, hy.* 6 v, 1844
1455. 衛生集 *Yei sei shiū, i, hy.* 明周宏 *Shiū Kō*, of the Ming
1456. 榮衛中經之圖 *Yei yei chiū kei no dzu*, 竿齋先生 Kansei Sensei, 1825
1457. 易氏醫按 *Yeki shi i an, ac, m.* 易大良 *Yeki dai-riyō, 1 v* 449
1458. 延喜式 *Yen gi shiki*, 255, 273, *hist.*
1459. 延壽配劑記 *Yen jiu hai zai ki, a, pr.* 4 v, 1670
1460. 延壽類要 *Yen jiu rui yō hy.* 竹田昭慶 Taketa Shōkei
1461. 延壽撮要 *Yen jiu satsu yō, hy.* 曲直瀨玄朔 Manase Gensaku 1 v
1462. 延壽撮要 *Yen jiu satsu yō, d, hy.* 曹元宰, 著郡山貞倫寫之 written by *Sō Gen-sai* and copied by Kōriyama Teirin, 1782
1463. 延壽和方彙函 *Yen jiu wa hō i kan, pr.* 三宅意安 Miyake Ian.
1464. 越俎藥誌 *Yes so yaku shi mm.*
1465. 用法規矩 *Yō hō ki ku*, 名護屋玄醫 Nagoya Geni
1466. 瘍醫大全 *Yō i dai zen, c, † as.* 顧世澄 *Kō Sei-chō*, 20 v, 1773
1467. 瘍醫大全 *Yō i dai zen, c, s.* 顧練齋 *Kō Sei-sai*, 1 v, 1700
1468. 瘍醫大全 *Yō i dai zen, a, s.* 顧練江 *Kō Ren-kō*, 48 v, 1736-96
1469. 洋醫駁義 *Yōi haku gi, a, md.* 喜多村寬 Kitamura Kuwan
1470. 瘍醫新書 *Yō i shin sho*, 330 s. 杉田玄伯 Sugita Gempaku, 3 v
1471. 養壽院秘錄 *Yō jiu in hi roku a, m.* 山脇道作 Yamawaki Dōsaku, 1 v
1472. 養壽院方函 *Yō jiu in hō kan, a, pr.* 山脇道作 Yamawaki Dōsaku, 1 v
1473. 養生物語 *Yō jō mono gatari*, 曲直瀨道三 Manase Dōsan
1474. 養生日覽 *Yō jō nichī ran*, 曲直瀨正紹 Manase Shōshō
1475. 養生日抄 *Yō jō nichī shō*, 後藤葛庵 Gotō Boan
1476. 養生囊 *Yō jō nō hy.*
1477. 養生歌 *Yō jō no uta, d, hy. in verse.* 法印安元 Hōin Angen, 1 v 1794
1478. 養生類要 *Yōjō rui yō i. hy.* 明吳正論 *Go Sei-rin, of the Ming*
1479. 養生七不可 *Yō jō shichi fu ka*, 330, *hy.* 杉田玄伯 Sugita Gempaku, 1 v
1480. 養生主論 *Yō jō shiū ron*, 名護屋玄醫 Nagoya Geni
1481. 養生鈔 *Yō jō shō*, 278, *hy.* 深根輔仁 Fukane Sukehito
1482. 養生要語 *Yō jō yō go, d, hy.* 林崇節 Hayashi Shiūsetsu; 2 v, 1701
1483. 養生善道 *Yō jō zen dō, d, hy.* 村井元升 Murai Genshō, 1 v, 1674
1484. 孕家尊生 *Yō ka son sei*, 358, *ob.* 富澤治雄 Tomisawa Jiuo
1485. 養記說 *Yō ki setsu, d, hy.* 守拙 Shiūsetsu, 5 v, 1851
1486. 幼科辨要 *Yō kuwa ben yō, a, cd.* 1 v
1487. 瘍科秘錄 *Yō kuwa hi roku, b,* 本間玄調 Homma Genchō, 10 v, 1847
1488. 瘍科方錄 *Yō kuwa hō roku, s.* 本間玄調 Homma Genchō, 1847

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1489. 瘍科方笈 Yō kuwa hō sen, a, s. 華岡震 Hanaoka Shin, 2 v
1490. 瘍科廣要 Yō kuwa kō yō, a, s. 淺田廣要 Asada Kōyō, 6 v
1491. 瘍科鎖言 Yō kuwa sa gen, 華岡震 Hanaoka Shin
1492. 瘍科三要 Yō kuwa san yō, 馬場貞由 Baba Teiyu, 2 v
1493. 瘍科選粹 Yō kuwa sen sui, † s. 陳文治 Chin Bun-ji, 8 v, 1628
1494. 幼科指南家傳秘法 Yō kwa shi nan ka den hi hō, † cd, pr. 萬全 Ban Zen, 1829
1495. 瘍科神書 Yō kuwa shin sho, 華岡震 Hanaoka Shin
1496. 楊氏家藏方 Yō shi ka zō hō, a, pr. 楊淡 Yō Tan, 9 v
- 450 1497. 要藥修治錄 Yō yaku shiū chi roku, 田村善之 Tamura Zenshi
1498. 用藥須知 Yō yaku su chi, 362, mm. 松岡玄達 Matsuoka Gentatsu
1499. 養嬰鎖言 Yō yei sa gen, 和田東郭 Wada Tōkuwaku
1500. 幼幼集成 Yō yō shiū sei, a, † cd. 陳復正 Chin Fuku-sei, 6 v, 1750
1501. 幼々新書 Yō yō shin sho, a, cd.
1502. 有毒本草圖說 Yū doku hon zō dzu setsu, tx. 清原仲巨 Kiyowara Chiūkiyo, 2 v, 1827
1503. 又玄餘草 Yū gen yo sō, 望月三英 Mochidzuki Sanyei
1504. 遊壺司命錄 Yū hō shi mei roku, 香月牛山 Kadzuki Giyūzan
1505. 胸穴辨解 Yu ketsu ben kai, e, 村上親方 Murakami Shinhō, 2 v
1506. 胸穴便解 Yu ketsu ben kai, e, 鈴木元彊 Sudzuki Genkiyō, 1 v, 1791
1507. 胸穴捷徑 Yu ketsu shō kei, e, 小坂元祐 Kozaka Genyū, 1 v
1508. 有林福田方 Yū rin fuku den hō, df, 12 v
1509. 有林福田方 Yū rin fuku den hō, 有隣 Yūrin the Priest, 12 v, 1657
1510. 雄畧紀 Yū riyaku ki, 263 hist.
1511. 熊志 Yū shi, sh. 難波義材 Naniwa Gisai
1512. 熊膽辨 Yū tan ben, a, on the bear's gall, 後藤長山 Gotō Konzan, 1 v
1513. 熊膽蕃椒 Yū tan han shō, 後藤長山 Gotō Konzan
1514. 熊胆說 Yū tan setsu, 320 on the bear's gall 後藤達 Gotō Tatsū
1515. 雜病辨要 Zatsu biyō ben yō, a, m. 淺田宗伯 Asada Sōhaku, 3 v
1516. 雜病治例 Zatsu biyō chi rei, i, 明劉純 Kiū Jun, of the Ming, 1 v
1517. 雜病廣要 Zatsu biyō kō yō, a, misc. 丹波元堅 Tamba Genken, 30 v
1518. 雜病廣要續編 Zatsu biyō kō yō zoku shō, a, misc. 1 v
1519. 雜病論議 Zatsu biyō ron shiki, a, misc. 淺田宗伯 Asada Sōhaku, 6 v
1520. 雜病試効 Zatsu biyō shi kō, 片倉元周 Katakura Genshiū
1521. 雜病翼方 Zatsu biyō yoku hō, a, misc.
1522. 全九集 Zen ku shiū, e,
1523. 全生指迷集 Zen sei shi mei shiū, i, 宋王昞 Ō Kiyō, of the Sung, 3 v
1524. 全書 Zen sho, 288, 景岳 Kei-gaku
1525. 全體新論 Zen tai shin ron, a, an. 合信氏 Dr. Hobson, written in Chinese, 2 v 1850



1526. 臟腑經絡詳解 Zō fu kei raku shō kai, 317, *an.* 岡本一抱 Okamoto Ippō  
 1527. 增補醫方口訣 Zō ho i hō kō ketsu, 中山三柳 Nakayama Sanriū  
 1528. 增補脈論 Zō ho miyaku ron, 1  
 1529. 增補濟民記 Zō ho sai min ki, 岡本啓迪院 Okamoto Keitekiin  
 1530. 續易簡方論 Zoku i kan hō ron, *bae, pr.* 施發 Shi Hatsu, of the Sung  
 dy. 3 v 1827  
 1531. 續易簡方論後集 Zoku i kan hō ron kō shiū, *ae, pr.* 盧祖常 Ro Sō-jō,  
 1532. 續上池秘錄 Zoku jōchi hi roku. *e, m.* 西川瑚子璉 Nishikawa Koshi-  
 ren, 1 v  
 1533. 續鴻寶秘要 Zokukō hō hi yō, *a,* 淨秀之 3 v, 1508 451  
 1534. 續古事談 Zokuko ji dan *hist.*  
 1535. 續名醫類案 Zoku mei i rui an, *i,* 清魏之秀 Gi Shin-shiū, of the  
 present dy, 60 v  
 1536. 續名家灸選 Zoku mei ka kiū sen, *e, cm.* 平井善 Hirai Zen, 1 v  
 1537. 續日本紀 Zoku ni hon gi, 270 *hist.*  
 1538. 續素問鈔 Zoku so mon shō, *i,* 明汪機 Wō Kī of the Ming, 9 v  
 1539. 續藥徵 Zoku yaku chō, 村井純 Murai Chin  
 1540. 續瘍科秘錄 Zoku yō kuwa hi roku, *b, s.* 本間玄調門人 By a pupil of  
 Honma Genchō, 1859  
 1541. 藏志 Zō shi, 334, *an.* 山脇尚德 Yamawaki Shōtoku, 1760

The following additions to and alterations in the original lists furnished the compiler were made and furnished him after the greater part of this list had been printed, and therefore too late for insertion therein.

1542. 仲景全書 Chiū kei zen sho, *e,* 張仲景 Cho Chiū-kei, Edited by 王叔和  
 Ō Shuku-kuwa with com. by 成無已 Sei Bu-ki, 6 v, 1756  
 1543. 眼目明鑑 Gan moku mei kan, *e,* 6 v  
 1544. No. 8. For 邑虞 Yū-kuwai, read, 邑環 Yū-kuwan  
 1545. No. 10. For 村上圖基 Murakami Toki, read, 和氣惟亨 Wake Ikō  
 1546. No. 13. Bai sō hi roku, *sy. e,* 村上 Murakami, read Bai sō hi roku, 成  
 九韶甫 Sei Kū Shō-fo  
 1547. Nos. 14, 15. For 村上 Murakami, read 村上圖基 Murakami Toki  
 1548. No. 18. Omit, *e*  
 1549. No. 29. For 佐藤神符滿 Satō Shinfuman, read 佐藥方定 Satō Hōtei  
 1550. No. 30. For 1507, read 1645  
 1551. No. 33. For Biyō in ho, 徽洵美 Kī Jun-bi, read Biyō in kō, 後藤良山  
 門人筆記 by a pupil of Gotō Konzan  
 1552. No. 36. For 革鷄 Kak kei, read, 革鷄 Sōkei

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- 1553, No. 55. For 東伯甫 *Tō Haku-ho*, read, 李菩 *Ri Bo*  
 1554, No. 58. For 峯宗伯 *Mine Sōhaku*, read, 峯宗英 *Mine Sōyei*  
 1555, No. 59. For Chi soku shin kiyō betsu roku bo (茅) *shi sō ri* read, Ch  
 soku shin kiyō betsu roku tei (弟) *shi sō ri*  
 1556, No. 62. For 池田霧溪 *Ikeda Mukei*, read, 池田瑞仙 *Ikeda Dzuisen*  
 1557, No. 69. For *Katsu senō*, read, *Katsu Sen-ō*  
 1558, No. 70. For *Riū ji-kuwa*, read 葛雅川 *Katsu Chi-sen*, of the *Tsin dy.*  
 1559, No. 71. For *Kō Sei-ro*, read, *Kō Sei-ro*, (Manase Shokei)  
 1560, No. 75. Omit, Wake and Tamba; see *Shin ō kiyō*, No. 1031  
 1561, No. 83. For 藤鳥巢 *Tō Chō sa*, read 藤謙齋 *Tō Kēn-sai*  
 1562, No. 88. For *ad*, read, *aed*, also insert, and 出雲廣貞 *Idzumo no*  
*Hirosoda*  
 452 1563, No. 102. For Senki Takuto, read, 船曳修徳夫 *Funabiki Shiūtoku*  
 1564, No. 122. For Akagi Guchokuō, read, 長尾愚直翁 *Nagao Guchokuō*  
 1565, No. 131. For Honjō Fuichi, read, 本庄俊薦 *Honjō Shuntoku*  
 1566, No. 147. For 陳若虛 *Chin Jaku-kiyō*, read 陳實功 *Chin Jitsu-kō*  
 1567, No. 158. Omit, pub. by Murakami Kuwanbiyōye  
 1568, No. 167. For Giyo yaku in hō, Chiga Yoshihisa, read, *Giyo yaku in hō*,  
 許公 *Kiyo Kō*  
 1569, 170. Omit. pub. by Mayegawa Rokuzaemon  
 1570, No. 183. For *Hen jaku sō kō den*, Chiū Kei-ken, read *Hen jaku sō kō*  
*den*. 中莖謙 *Nakakuki Yudzuru*  
 1571, No. 187. For *Hen so den kak kai Gen Kiyō*, read, *Hen sō den kak kai*  
 安藤惟寅 *Andō Iin*  
 1572, No. 251. Insert after *cd.*, rev. by  
 1573, No. 253, 257, 304, 321, 341, 452, 454. Omit, *e*,  
 1574, No. 268. For *I gaku gen jū*, read *I rai*, (壘) *Genjiū* See 377  
 1575, No. 276. For *Ri sei sō shaku*, 1565, read, 樓英 *Rō Yei*, 1662  
 1576, No. 307. For *Ta-Yō-hō*, 1751, read, 何夢瑤 *Ka Bō-yō*  
 1577, No. 324. For *Chiūtenan*, 1682, read, 休寧認 *Kiū-nei Jin-an*, 1726  
 1578, No. 328. For *I sei tai sei ron*, etc. read, *I hō tai sei ron* 諺解 *gen kai*  
 5579, No. 348. Omit (宗), *Sung*, and read, 1816  
 1580, No. 352. For *Shiu Gen-do*, read 程應旆 *Tei Ō-bo*  
 1581, No. 353. Omit, edited by etc., and insert, 內藤希哲 *Naitō Kitetsu*  
 1582, No. 355. For *I kiyō shi nan so nan yō*, *Gawai san Chiku in Doki*, read  
*I kiyō shi nan sō na yō* (旨) *shi*, *Guwaisan Chikuin Doki*  
 1583, No. 368. For Oka Kuwantai, read, 關口本貞 *Sekiguchi Hontei*  
 1584, No. 372. For *In tō riyaku*, read, *In tō riyaku*, 邱煒 *Kiū Kī*  
 1585, No. 404. For *Mutekian*, read, 醫隱草谿 *Iin Sōkei*  
 1586, No. 428. For *Tō Shi-ken*, read 滑壽 *Katsu Jiu*

- 1587, No. 432. For Ōhaihi Kōdō, read, 牛淵 Ushibuchi  
1588, No. 456. For Hirano Chōki, read, 平野重誠 Hirano Chōsei  
1589, No. 602. For Yasumaro, read, 太安磨 Ōno Yasumaro, 712  
1590, No. 609. For Ko kon gan kuwa hō sen, read, Ko kon sei sen 精選 gan  
kuwa hō sen  
1591, No. 662. For 親 (third character), read, 新  
1592, No. 707. For Miyake ketsu, read *Miyake ketsu*, 崔嘉彦 *Sai ka-gen*, 1 v,  
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1594, No. 1537. Insert 菅野真道 Sugano Mamichi and 藤原繼繩 Fujiwara  
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*Note.*—Nos. 1101 to 1121 inclusive should follow No. 1054.

CHINESE AND JAPANESE MEDICAL  
AUTHORS.<sup>1</sup>

The following list has been compiled from the writings of the authors mentioned in the foregoing notes, and also from the list of Chinese and Japanese medical works given on pages 405 to 452. The names of Chinese authors appear in *italics*, and those of Japanese, in Roman. It should be borne in mind that the names of Chinese authors, unlike those of Japanese, are often preceded by the name of the dynasty during which they wrote. In this list, however, the dynasty, when given, appears in abbreviation<sup>2</sup> only, and immediately following the author's name, and is omitted from the name itself. The family name, which usually follows next, coupled with the title *Shi* (氏), is often the principal name by which the writer is known, as, for instance, *Sung Chō Ro-giyoku*, who is usually styled *Chō Shi*, or *Sung Chō Shi* (i.e. Master *Chō* of the Sung Dynasty). The Chinese characters are only placed after Chinese names.

In Japan the syllable (or syllables) following the family name (*sei* 姓) constitutes the individual or given name. Among Japanese physicians, the custom has long obtained of adopting in addition to the *zōku-miyō* 俗名 or common

1. The proper names mentioned in the foregoing notes appear also in this list.

2. The following abbreviations have been adopted: **AH**, After Han 後漢 A. D. 221-264; **EH**, Eastern Han 東漢 A. D. 25-221; **H**, Han, B. C. 漢 206 A. D. 25; **M**, Ming, 明 A. D. 1368-1644; **S**, Sung, 宋, First, A. D. 420-478; Second, A. D. 906-1127 (but a very few of the authors mentioned belonged to the First Sung); **Ta**, T'ang, 唐 A. D. 620-907; **Ts**, Tsin, 晉 A. D. 265-322; **Ts'g**, Ts'ing, the dynasty now ruling, began A.D. 1644; **Sui**, A.D. 589-619; **Y**, Yuen, 元 A.D. 1280-1368.

personal name, a professional name suggestive, from usage or associations, of their calling, smch as *Gempaku*, *Hōan*, etc.; and sometimes this adopted name suffixed by the title *Sensei* (先生), Master, becomes the popular name by which the author is known during life, and also his posthumous title, as, for instance, Ono Motohiro, also known as Ono Ranzan or Ranzan Sensei (see note 18, page 305).

The adopted name only appears in the list following the family name, except when the author is well known by both names, in which case both are given.

The century during which each author flourished, when stated in the works to which the writer has referred, is denoted in the list by the Roman numerals, and the portion of the century by the letters b, m, e, standing for "beginning," "middle," "end," as xvi-m, the middle of the sixteenth century.

The italic figures following these names refer to the page of the foregoing notes, wherein the name of the author is mentioned, and the Arabic figures, to the number of the work in the preceding list in which the author's name appears.

An asterisk following the name of an author denotes that the same appears in Asada Koretsune's *Kō-koku-mei-i-den*, or, Lives of Famous Japanese Physicians (see page 387). A dagger denotes that the author's name appears in the Catalogue of the Imperial Library at Pekin (see p. 406.)

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A few omissions, such as in spelling *Hon-zō*, *Hon-zo*, *Nan-kiyō*, *Nan-kiyo*, etc., occurring in the first few pages have been, so far as detected, corrected in the spelling of the names of these works as given in the list of medical works, pp. 405-452. In this latter list and also in the list of authors, pp. 453-469, the syllables written in the paper, *chū*, *shū* and *jū* are, with certain exceptions, written *chiū*, *shiū* and *jiū*.

DISCUSSION.

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The Chairman, in thanking the author in the name of the Society for his valuable historical paper, drew attention to the comparative freedom from superstitious rites in the ancient Japanese treatment of disease. In the subsequent development of the art, the great event undoubtedly was the translation by Sugita and his co-workers of the Dutch book on anatomy. Since then the progress had been simply determined by the rapidity with which Japan had assimilated Western ideas. The present system by which the Government controls, by means of its license laws and well-ordered laboratories, the sale of drugs and medicines, was highly commendable.

Dr. Whitney subsequently mentioned the very perfect control which the Government exercised over the sale of opium—which was, so far as he knew, quite unique amongst the legislative measures of civilized nations. All the opium sold in Japan was retailed by the Government to the druggists, who were obliged to give twice a year a full account of their sales. Also, the purchaser had to present a written certificate signed by a licensed doctor or dealer in drugs.

47<sup>1</sup> Mr. Korschelt's Paper "On the *Tenken* System of Japanese Fortune Telling" has not yet been received for publication. The Council has thought it advisable to print the following abstract with the discussion in its proper place:—

The Japanese calendar forms the basis of the system; and by an application of certain rules to the date of a man's birth, that man's character can be determined. The qualities assigned to each year, month, and day, each of which is represented by one of twelve *kata kana*, seem to have some resemblance to the characters of the corresponding calendar animals—tiger, hare, dragon, serpent, etc. From the 5 *kata kana* which correspond to the year and month of conception and the year, month, and day of birth, the chief points of a person's character are made out—the most important determining factors being the year of birth and month of conception. Then come to be considered the effect of the stars which are supposed to rule the years, months, and days. For each year there are nine stars, which have their special qualities; and each man's life is to be ruled by one of them. From the mutual relation of these stars, the life relations of two given people can be made out. One very important application of the system amongst the Japanese is the comparison of the ruling stars of two who are contemplating marriage; Similarly, as each instant of time is ruled by a star, it can be determined whether a given year, month, or day will be lucky or unlucky to a certain individual. The method was illustrated by examples, the author having worked out the horoscopes of Cromwell, Carlyle, Bismarck, Napoleon, and other historic characters.

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#### DISCUSSION.

The Chairman, in thanking Mr. Korschelt for his paper, remarked that the chief interest of divination and kindred subjects to us moderns is an extrinsic one. What we should like to find out is how such follies can have originated, and how they can have obtained such sway, over the human mind. The Japanese system of fortune-telling which had just been explained was clearly traceable to China, where it was practised at the very earliest times to which our information reaches back. This is the so-called system of philosophy embodied in the "*I Ching*" (Jap. *Eki Kyō* 易經), the oldest of all Chinese books. At present a fierce controversy is being carried on between different sinologists



in Europe on the subject of this very book. If, as one party asserts, the "*Yi Ching*" is not originally Chinese at all, but borrowed (so far as its most ancient part is concerned) from the extinct Accadians, then too, Japanese divination will be proved to be another among the many mental products imported from the West.

Mr. Milne, in the course of his remarks, pointed out that when we come to look at the question scientifically, we must come to the conclusion that there must be at present hundreds of people of exactly the same character, depending upon their special combination of 5 out of 12 472 symbols. Of such combinations there is a limited calculable number. Besides, the number of persons born in the same month must be very large and can easily be estimated. These should, according to the *Ten-ken* system, be exactly alike in character and fortune. All such divination systems he regarded as the survival of the unfit.

Dr. Knott drew attention to the points of resemblance and difference between the *Ten-ken* system, and the old complex system of astrology practised for centuries in the Old World. Astrology certainly was not so puerile as this Japanese system, inasmuch as it required for a perfect casting of the horoscope an exact knowledge of the instant and place of birth, conditions which must be different for every individual.

Mr. Korschelt, in reply to certain remarks of Mr. Milne's said that he had tested the accuracy of the system by forming groups of typical characters and counting the predominating symbols. It was found that when a sufficient number of cases were considered, all differences vanished, and one symbol occurred as frequently in one group as in another. This, of course, completely disproved the system.

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